

**ANTIFROGEN N**

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Substance key: SXR024717

Revision Date: 11.02.2022

Version : 1 - 0 / D

Date of printing : 13.09.2022

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

**1.1. Product identifier**

Trade name

**ANTIFROGEN N**

Material number: 107601

UFI: 7E80-S0FG-R00M-N1PF

Chemical nature: Monoethylene glycol (1,2-ethane diol) with corrosion inhibitors

**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)

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**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 : Danger

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

Precautionary statements : **Prevention:**  
P260 Do not breathe mist or vapours.  
P264 Wash skin thoroughly after handling.  
P280 Wear eye protection/ face protection.

**Response:**  
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.  
P314 Get medical advice/ attention if you feel unwell.

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

**Hazardous components which must be listed on the label:**

Ethanediol

**2.3 Other hazards**

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

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

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

No additional hazards are known except those derived from the labelling.

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**SECTION 3: Composition/information on ingredients**

**3.2 Mixtures**

**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-	Acute Tox. 4; H302 STOT RE 2; H373 (Kidney)	>= 90 - <= 100

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	0003 01-2119456816-28- 0038 01-2119456816-28- XXXX		
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For explanation of abbreviations see section 16.

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**SECTION 4: First aid measures**

**4.1 Description of first aid measures**

- General advice : Remove/ Take off immediately all contaminated clothing.  
Get medical advice/ attention if you feel unwell.
- 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 soap and 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 : If swallowed do not induce vomiting, seek medical advice and  
show safety datasheet or label

**4.2 Most important symptoms and effects, both acute and delayed**

- Symptoms : The possible symptoms known are those derived from the  
labelling (see section 2).
- Risks : The possible risks known are those derived from the labelling  
(see section 2).

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

- Treatment : Treat symptomatically.

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**SECTION 5: Firefighting measures**

**5.1 Extinguishing media**

- Suitable extinguishing media : Water spray jet  
Alcohol-resistant foam  
Carbon dioxide (CO<sub>2</sub>)  
Dry powder

**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 (NO<sub>x</sub>)

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**5.3 Advice for firefighters**

Special protective equipment : Self-contained breathing apparatus  
for firefighters

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**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.

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**SECTION 7: Handling and storage**

**7.1 Precautions for safe handling**

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

Advice on protection against : Observe the general rules of industrial fire protection  
fire and explosion

Hygiene measures : Keep away from food and drink.

Temperature class : T2

**7.2 Conditions for safe storage, including any incompatibilities**

Advice on common storage : Do not store with alkalis  
Do not store with strong oxidizing agents

Storage class (TRGS 510) : 10

**7.3 Specific end use(s)**

Specific use(s) : No further recommendations.

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**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/m <sup>3</sup>	2000/39/EC
	Further information: Identifies the possibility of significant uptake through the skin, Indicative			
		STEL	40 ppm 104 mg/m <sup>3</sup>	2000/39/EC
	Further information: Identifies the possibility of significant uptake through the skin, Indicative			
		AGW (Vapour and aerosols)	10 ppm 26 mg/m <sup>3</sup>	DE TRGS 900
	Peak-limit: excursion factor (category): 2;(I)			
	Further information: Skin absorption, When there is compliance with the OEL and biological tolerance values, there is no risk of harming the unborn child			

**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	Inhalation	Long-term local effects	35 mg/m <sup>3</sup>
	Remarks:DNEL			
	Workers	Dermal	Long-term systemic effects	106 mg/kg bw/day
	Remarks:DNEL			
	Consumers	Inhalation	Long-term local effects	7 mg/m <sup>3</sup>
	Remarks:DNEL			
	Consumers	Dermal	Long-term systemic effects	53 mg/kg bw/day
	Remarks:DNEL			

**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
	Water (intermittent release)	10 mg/l
	Marine water	1 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**

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- Eye protection : For details, see the BG-rules number 192.  
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 only in well-ventilated areas.  
In the case of vapour formation use a respirator with an approved filter.  
Equipment should conform to EN 14387  
If the occupational exposure limits cannot be met, in exceptional cases suitable respiratory equipment should be worn only for a short period of time.
- Filter type : Organic vapour type (A)
- Protective measures : Do not inhale vapours  
Avoid contact with skin and eyes.

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**SECTION 9: Physical and chemical properties**

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

- Physical state : Liquid
- Colour : yellow
- Odour : slightly perceptible
- Odour Threshold : no data available
- Melting point : -32 °C  
Method: DIN 51583
- Boiling point : 166 °C (1.013 hPa)  
Method: ASTM D 1120
- Flammability : Not applicable

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Upper explosion limit / upper flammability limit	:	no data available
Lower explosion limit / Lower flammability limit	:	3 %(V) Data relate to solvent
Flash point	:	119 °C Method: ASTM D6450 (closed cup)
Auto-ignition temperature	:	> 400 °C Method: DIN 51794
Decomposition temperature	:	> 300 °C Method: DSC Measurement under nitrogen No decomposition up to 300 °C.
pH	:	approx. 8 (20 °C) Concentration: 10 % Method: DIN 19268
Viscosity		
Viscosity, dynamic	:	20,3 mPa.s (20 °C)
Viscosity, kinematic	:	20,3 mm <sup>2</sup> /s (20 °C) Method: DIN 51562
Solubility(ies)		
Water solubility	:	(20 °C) completely miscible
Solubility in other solvents	:	Not applicable
Partition coefficient: n-octanol/water	:	Not applicable
Vapour pressure	:	< 0,01 kPa (20 °C) Method: Calculated by Syracuse.
Density	:	1,1138 g/cm <sup>3</sup> (20 °C) Method: DIN 51757
Relative vapour density	:	no data available
Particle characteristics		
Particle size	:	Not applicable

**9.2 Other information**

Explosives	:	Not explosive Method: Expert judgement
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.

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Method: Expert judgement

Self-ignition : no data available

Metal corrosion rate : < 6,25 mm/a

Surface tension : 33,8 mN/m

Molecular weight : Not applicable

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**SECTION 10: Stability and reactivity**

**10.1 Reactivity**

See section 10.3. "Possibility of hazardous reactions"

**10.2 Chemical stability**

Stable under normal conditions.  
hygroscopic

**10.3 Possibility of hazardous reactions**

Hazardous reactions : Reactions with oxidising agents.

Stable

**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

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**SECTION 11: Toxicological information**

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

**Acute toxicity**

**Product:**

Acute oral toxicity : Acute toxicity estimate: 528,84 mg/kg  
Method: Calculation method

Acute inhalation toxicity : LC50 (Rat, male and female): > 2,5 mg/l  
Exposure time: 6 h  
Test atmosphere: dust/mist  
Remarks: Information refers to the main component.

Acute dermal toxicity : LD50 (Mouse, male and female): > 3.500 mg/kg  
Remarks: Information refers to the main component.



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**Components:**

**Ethanediol:**

- Acute oral toxicity : LD50 (Rat, male and female): Method: Other  
GLP: no  
Assessment: The component/mixture is moderately toxic after single ingestion.
- Acute inhalation toxicity : LC50 (Rat, male and female): > 2,5 mg/l  
Exposure time: 6 h  
Test atmosphere: dust/mist  
Method: Other  
GLP: yes  
Assessment: The substance or mixture has no acute inhalation toxicity
- Acute dermal toxicity : LD50 (Mouse, male and female): > 3.500 mg/kg  
Method: Other  
GLP: yes  
Assessment: The substance or mixture has no acute dermal toxicity

**Skin corrosion/irritation**

**Product:**

- Species : Rabbit  
Result : No skin irritation  
Remarks : Information refers to the main component.

**Components:**

**Ethanediol:**

- Species : Rabbit  
Exposure time : 20 h  
Method : Other  
Result : No skin irritation  
GLP : no

**Serious eye damage/eye irritation**

**Components:**

**Ethanediol:**

- Species : Rabbit  
Exposure time : 24 h  
Method : Other  
Result : No eye irritation  
GLP : no

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**Respiratory or skin sensitisation**

**Product:**

Test Type : Guinea pig maximization test  
Species : Guinea pig  
Method : Magnusson/Kligman  
Result : non-sensitizing  
Remarks : Information refers to the main component.

**Components:**

**Ethanediol:**

Test Type : Maximisation Test  
Exposure routes : Dermal  
Species : Guinea pig  
Method : OECD Test Guideline 406  
Result : Not a skin sensitizer.  
GLP : yes

Assessment : Harmful if swallowed.

**Germ cell mutagenicity**

**Product:**

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

Information refers to the main component.

**Components:**

**Ethanediol:**

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

Test Type: Chromosome aberration test in vitro  
Test system: Chinese hamster ovary cells  
Metabolic activation: with and without metabolic activation  
Method: Other

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Result: negative  
GLP: yes

Test Type: In vitro mammalian cell gene mutation test  
Test system: mouse lymphoma cells  
Metabolic activation: with and without metabolic activation  
Method: OECD Test Guideline 476  
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 evidence of carcinogenicity in animal studies.

Information refers to the main component.

**Components:**

**Ethanediol:**

Species : Mouse, male and female  
Application Route : oral (feed)  
Exposure time : 2 a  
Dose : 6250-12500-25000-50000 ppm  
Control Group : yes  
Frequency of Treatment : daily  
NOAEL : 1.500 mg/kg bw/day  
Method : Other  
GLP : yes

Carcinogenicity -  
Assessment : Not classifiable as a human carcinogen.

**Reproductive toxicity**

**Product:**

Reproductive toxicity -  
Assessment : No indications of toxic effects were observed in reproduction  
studies in animals.

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No reproductive toxicity to be expected.

Information refers to the main component.

Information refers to the main component.

**Components:**

**Ethanediol:**

Effects on fertility : Test Type: Three-generation study  
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 : Test Type: reproductive and developmental toxicity study  
Species: Rat, female  
Strain: Sprague-Dawley  
Application Route: oral (gavage)  
Dose: 150 - 500 - 1000 - 2500 mg/kg  
Duration of Single Treatment: 9 d  
General Toxicity Maternal: NOEL: 1.500 mg/kg body weight  
Teratogenicity: NOEL: 150 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.

**STOT - repeated exposure**

**Product:**

Remarks : no data available

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**Components:**

**Ethanediol:**

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

**Repeated dose toxicity**

**Product:**

Species : Rat, male and female  
NOAEL : 200 mg/kg  
Application Route : oral (gavage)  
Method : OECD Test Guideline 407  
Remarks : Information refers to the main component.

Species : Rat, male  
NOAEL : 150 mg/kg  
Application Route : oral (feed)  
Method : OECD Test Guideline 408  
Remarks : Information refers to the main component.

Species : Dog, male  
NOAEL : 2,22 mg/kg  
Application Route : Dermal  
Method : OECD Test Guideline 410  
Remarks : Information refers to the main component.

**Components:**

**Ethanediol:**

Species : Rat, male  
NOAEL : 150 mg/kg bw/day  
Application Route : oral (feed)  
Exposure time : 16 w  
Number of exposures : daily  
Dose : 50 - 150 - 500 - 1000 mg/kg  
Control Group : yes  
Method : OECD Test Guideline 408  
GLP : No information available.

Species : Dog, male  
NOAEL : 2.200 - 4.400 mg/kg bw/day  
Application Route : Dermal  
Exposure time : 4 w  
Number of exposures : daily  
Dose : 2 - 4 mL/kg bw  
Control Group : yes  
Method : OECD Test Guideline 410  
GLP : yes

Species : Rat, male and female  
NOAEL : 200 mg/kg bw/day

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Application Route : oral (gavage)  
Exposure time : 33 d  
Number of exposures : daily  
Dose : 220, 660, 2000 mg/kg bw/day  
Control Group : yes  
Method : OECD Test Guideline 407

Species : Rat, male  
NOAEL : 150 mg/kg bw/day  
Application Route : oral (feed)  
Exposure time : 12 months  
Number of exposures : daily  
Dose : 50, 150, 300, 400 mg/kg bw/day  
Control Group : yes  
Method : OECD Test Guideline 452

**Aspiration toxicity**

**Product:**

no data available

**Components:**

**Ethanediol:**

No aspiration toxicity classification

**11.2 Information on other hazards**

**Endocrine disrupting properties**

**Product:**

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

**Further information**

**Product:**

Remarks : Kidney injury may occur.

Remarks : Poisoning affects the central nervous system

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

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**SECTION 12: Ecological information**

**12.1 Toxicity**

**Product:**

- Toxicity to fish : LC0 (Leuciscus idus (Golden orfe)): 1.000 mg/l  
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 : EC50 (Daphnia magna (Water flea)): > 100 mg/l  
Exposure time: 48 h  
Method: OECD Test Guideline 202  
Remarks: Information refers to the main component.
- Toxicity to algae/aquatic plants : EC50 (Selenastrum capricornutum (green algae)): 6.500 - 13.000 mg/l  
Exposure time: 96 h  
Remarks: Information refers to the main component.
- Toxicity to microorganisms : EC20 (activated sludge): > 1.995 mg/l  
Exposure time: 30 min  
Method: ISO 8192  
Remarks: Information refers to the main component.

**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/aquatic plants : EC50 (Pseudokirchneriella subcapitata (green algae)): 6.500 - 13.000 mg/l  
End point: Growth rate  
Exposure time: 7 d  
Test Type: static test

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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

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 value is given based on a SAR/AAR approach using OECD Toolbox, DEREK, VEGA QSAR models (CAESAR models), etc.

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.

**12.2 Persistence and degradability**

**Product:**

Biodegradability : Biodegradation: 90 - 100 %  
Exposure time: 10 d  
Method: OECD Test Guideline 301A  
Remarks: Readily biodegradable, according to appropriate OECD test.  
Information refers to the main component.

**Components:**

**Ethanediol:**

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



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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

Partition coefficient: n-octanol/water : log Pow: -1,36  
Method: estimated  
GLP: no

**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  
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).

**12.6 Endocrine disrupting properties**

**Product:**

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

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levels of 0.1% or higher.

**12.7 Other adverse effects**

**Product:**

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

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**SECTION 13: Disposal considerations**

**13.1 Waste treatment methods**

Product : Product should be taken to a suitable and authorized waste disposal site in accordance with relevant regulations and if necessary after consultation with the waste disposal operator and/or the competent Authorities

Contaminated packaging : Packaging that cannot be cleaned should be disposed of as product waste

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**SECTION 14: Transport information**

**Section 14.1. to 14.5.**

<b>ADR</b>	not restricted
<b>ADN</b>	not restricted
<b>RID</b>	not restricted
<b>IATA</b>	not restricted
<b>IMDG</b>	not restricted

**14.6. Special precautions for user**

See sections 6 to 8 of this Safety Data Sheet.

**14.7. Maritime transport in bulk according to IMO instruments**

No transport as bulk according IBC - Code.

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**SECTION 15: Regulatory information**

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

- REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII) : Not applicable
- REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59). : Not applicable
- Regulation (EC) No 1005/2009 on substances that deplete the ozone layer : Not applicable
- Regulation (EU) 2019/1021 on persistent organic pollutants (recast) : Not applicable
- Council Regulation (EC) No 111/2005 laying down rules for the monitoring of trade between the Community and third countries in drug precursors : Neither banned nor restricted
- Regulation (EC) No 649/2012 of the European Parliament and the Council concerning the export and import of dangerous chemicals : Not applicable
- REACH - List of substances subject to authorisation (Annex XIV) : Not applicable
- Water hazard class (Germany) : 1 slightly hazardous to water  
Classification according to AwSV, Annex 1 (5.2)
- Volatile organic compounds : Directive 2004/42/EC  
According to the composition, the product contains no VOC components as defined by Directive 2004/42/EC.

**Other regulations:**

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

Take note of the national regulations on the protection of young people at work.

Occupational restrictions for pregnant and breast feeding women

**15.2 Chemical safety assessment**

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

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**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  
2000/39/EC : Europe. Commission Directive 2000/39/EC establishing a first list of indicative occupational exposure limit values  
DE TRGS 900 : Germany. TRGS 900 - Occupational exposure limit values.  
2000/39/EC / TWA : Limit Value - eight hours  
2000/39/EC / STEL : Short term exposure limit  
DE TRGS 900 / AGW : Time Weighted Average

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

**Further information**

- Other information : Observe national and local legal requirements

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**Classification of the mixture:**

Acute Tox. 4                      H302  
STOT RE 2                        H373

**Classification procedure:**

Calculation method  
Calculation method

This information corresponds to the present state of our knowledge and is intended as a general description of our products and their possible applications. Clariant makes no warranties, express or implied, as to the information's accuracy, adequacy, sufficiency or freedom from defect and assumes no liability in connection with any use of this information. Any user of this product is responsible for determining the suitability of Clariant's products for its particular application. Nothing included in this information waives any of Clariant's General Terms and Conditions of Sale, which control unless it agrees otherwise in writing. Any existing intellectual/industrial property rights must be observed. Due to possible changes in our products and applicable national and international regulations and laws, the status of our products could change. Material Safety Data Sheets providing safety precautions, that should be observed when handling or storing Clariant products, are available upon request and are provided in compliance with applicable law. You should obtain and review the applicable Material Safety Data Sheet information before handling any of these products. For additional information, please contact Clariant.

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**Exposure scenario**

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

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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**

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



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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 cm<sup>2</sup>

**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 safety 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**

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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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>  
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 cm<sup>2</sup>  
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

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No specific measures identified.

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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 cm<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

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**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 safety 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 cm<sup>2</sup>

**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 safety 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 Mixture/Article : <= 100 %

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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 cm<sup>2</sup>

**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 safety 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/m <sup>3</sup> (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	Exposure estimate	RCR
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of effects		
Worker - inhalative, long-term - local and systemic	2,59 mg/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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)**

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Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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**

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No information available.

## 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)



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**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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**Other operational conditions affecting workers exposure**

Outdoor / Indoor : Indoor use

**Risk Management Measures**

Note : Chemical production or refinery in closed continuous process

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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 safety 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 cm<sup>2</sup>  
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 cm<sup>2</sup>  
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 safety 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 : <= 100 %

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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 cm<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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:

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Effectiveness (of a measure) : 90 %  
Wear suitable respiratory protection.

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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<sup>2</sup>

**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 safety 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.

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Covers skin contact area up to : 480 cm<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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 safety 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 Mixture/Article : <= 100 %

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

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**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 cm<sup>2</sup>

**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 safety 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/m <sup>3</sup> (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/m <sup>3</sup> (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term -	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01

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systemic		
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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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	2,59 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0,07

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- 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

**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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term -	3,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03



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systemic		
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/m <sup>3</sup> (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**

No information available.

**3. ES 3: Industrial use; Distribution of substance**

**3.1. Title section**

Environment		
CS1:	Formulation or re-packing (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:	Formulation or re-packing (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Formulation or re-packing (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Formulation or re-packing (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:	Formulation or re-packing (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a

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CS6: Formulation or re-packing (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: Formulation or re-packing (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: Formulation or re-packing (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: Formulation or re-packing (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<sup>2</sup>

#### 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.

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**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety goggles.

**3.2.3 ES 3 - CS 3: Control of worker exposure: Formulation or re-packing (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<sup>2</sup>

**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 safety goggles.

**3.2.4 ES 3 - CS 4: Control of worker exposure: Formulation or re-packing (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**

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Dermal exposure : Palm of one hand  
Covers skin contact area up to : 240 cm<sup>2</sup>  
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 cm<sup>2</sup>  
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 safety goggles.

**3.2.5 ES 3 - CS 5: Control of worker exposure: Formulation or re-packing (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<sup>2</sup>

**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 %

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**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety goggles.

**3.2.6 ES 3 - CS 6: Control of worker exposure: Formulation or re-packing (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<sup>2</sup>

**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 safety goggles.

**3.2.7 ES 3 - CS 7: Control of worker exposure: Formulation or re-packing (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

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Covers skin contact area up to : hands / one hand / palm of hands.  
: 240 cm<sup>2</sup>

**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 safety goggles.

### 3.3. ES 3 Exposure estimation and reference to its source

**3.3.2 ES 3 - CS 2: Worker exposure: Formulation or re-packing (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/m <sup>3</sup> (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: Formulation or re-packing (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/m <sup>3</sup> (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

**3.3.4 ES 3 - CS 4: Worker exposure: Formulation or re-packing (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)**

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Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m <sup>3</sup> (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/m <sup>3</sup> (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: Formulation or re-packing (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/m <sup>3</sup> (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: Formulation or re-packing (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/m <sup>3</sup> (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

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Worker - inhalative, long-term - local and systemic	12,94 mg/m <sup>3</sup> (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: Formulation or re-packing (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/m <sup>3</sup> (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**

No information available.

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

**4.1. Title section**

Environment	
CS1: Formulation or re-packing (Formulation into mixture)	ERC2
Workers	
CS2: Formulation or re-packing (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3: Formulation or re-packing (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4: Formulation or re-packing (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: Formulation or re-packing (Mixing or blending in batch processes)	PROC5



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CS6: Formulation or re-packing (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS7: Formulation or re-packing (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: Formulation or re-packing (Tabletting, compression, extrusion, pelettisation, granulation)	PROC14
CS9: Formulation or re-packing (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: Formulation or re-packing (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: Formulation or re-packing (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<sup>2</sup>

#### 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 safety goggles.

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**4.2.3 ES 4 - CS 3: Control of worker exposure: Formulation or re-packing (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<sup>2</sup>

**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 safety goggles.

**4.2.4 ES 4 - CS 4: Control of worker exposure: Formulation or re-packing (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 cm<sup>2</sup>  
Remarks : Manufacture or formulation in the chemical industry in closed

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Dermal exposure : batch processes with occasional controlled exposure or processes with equivalent containment condition  
: Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.  
Covers skin contact area up to : 480 cm<sup>2</sup>  
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 safety goggles.

**4.2.5 ES 4 - CS 5: Control of worker exposure: Formulation or re-packing (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<sup>2</sup>

**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 safety goggles.

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**4.2.6 ES 4 - CS 6: Control of worker exposure: Formulation or re-packing (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<sup>2</sup>

**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 safety goggles.

**4.2.7 ES 4 - CS 7: Control of worker exposure: Formulation or re-packing (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<sup>2</sup>

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**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 safety goggles.

**4.2.8 ES 4 - CS 8: Control of worker exposure: Formulation or re-packing (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 cm<sup>2</sup>

**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 safety goggles.

**4.2.9 ES 4 - CS 9: Control of worker exposure: Formulation or re-packing (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**

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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 cm<sup>2</sup>

**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 safety goggles.

**4.3. ES 4 Exposure estimation and reference to its source**

**4.3.2 ES 4 - CS 2: Worker exposure: Formulation or re-packing (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/m <sup>3</sup> (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: Formulation or re-packing (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/m <sup>3</sup> (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

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**4.3.4 ES 4 - CS 4: Worker exposure: Formulation or re-packing (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/m <sup>3</sup> (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/m <sup>3</sup> (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: Formulation or re-packing (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/m <sup>3</sup> (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: Formulation or re-packing (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/m <sup>3</sup> (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

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**4.3.7 ES 4 - CS 7: Worker exposure: Formulation or re-packing (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/m <sup>3</sup> (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/m <sup>3</sup> (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: Formulation or re-packing (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/m <sup>3</sup> (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: Formulation or re-packing (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/m <sup>3</sup> (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



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

No information available.

**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**

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**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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**Other operational conditions affecting workers exposure**

Outdoor / Indoor : Indoor use

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**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 safety 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 cm<sup>2</sup>  
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 cm<sup>2</sup>  
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 safety goggles.

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

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**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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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.

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Effectiveness (of a measure) : 90 %

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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 cm<sup>2</sup>

**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 safety 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

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**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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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 safety goggles.

**5.3. ES 5 Exposure estimation and reference to its source**

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**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/m <sup>3</sup> (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/m <sup>3</sup> (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 - local and systemic	7,76 mg/m <sup>3</sup> (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/m <sup>3</sup> (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term -	6,86 mg/kg bw/day (ECETOC TRA worker v2.0,	0,06

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systemic	Chemical production where opportunity for exposure arises)	
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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37



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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/m <sup>3</sup> (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/m <sup>3</sup> (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**

<b>Environment</b>	
CS1: Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article))	ERC4
<b>Workers</b>	
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

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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 cm<sup>2</sup>

#### 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

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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 safety 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 cm<sup>2</sup>

**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 safety 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

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**Human factors not influenced by risk management**

Dermal exposure : Palm of one hand  
Covers skin contact area up to : 240 cm<sup>2</sup>  
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 cm<sup>2</sup>  
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 safety 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<sup>2</sup>

**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 %

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**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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 m<sup>3</sup>

**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 distance between the source of emission and the worker is at least 1m.

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 : Regular cleaning of equipment

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prevent /limit releases, dispersion  
and exposure

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 safety 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 cm<sup>2</sup>

**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 safety 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

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**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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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 safety goggles.

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

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**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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**Other operational conditions affecting workers exposure**

Outdoor / Indoor : Indoor use



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**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 safety 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/m <sup>3</sup> (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 of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m <sup>3</sup> (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/m <sup>3</sup> (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch)	0,22

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	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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term -	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13

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systemic		
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/m <sup>3</sup> (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/m <sup>3</sup> (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 of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m <sup>3</sup> (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/m <sup>3</sup> (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

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

No information available.

**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, Tableting, 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),**

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**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 cm<sup>2</sup>  
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 cm<sup>2</sup>  
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

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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

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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 cm<sup>2</sup>

**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 safety 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**

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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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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 safety goggles.

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**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 cm<sup>2</sup>

**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 safety 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



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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 distance between the source of emission and the worker is at least 1m.

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 safety goggles.

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**7.2.8 ES 7 - CS 8: Control of worker exposure: Professional use (Treatment of articles by dipping and pouring, Tableting, 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 cm<sup>2</sup>

**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 safety 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.

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Covers skin contact area up to : 240 cm<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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 safety 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**

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**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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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

**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
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Worker - inhalative, long-term - local and systemic	25,88 mg/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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

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**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/m <sup>3</sup> (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/m <sup>3</sup> (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, Tableting, 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/m <sup>3</sup> (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/m <sup>3</sup> (ECETOC TRA worker v2.0, Tableting, compression, extrusion, pelettisation, granulation)	0,74
Worker - dermal, long-term - systemic	3,43 mg/kg bw/day (ECETOC TRA worker v2.0, Tableting, compression, extrusion, pelettisation, granulation)	0,03
combined routes	ECETOC TRA worker v2.0, Tableting, compression, extrusion, pelettisation, granulation	0,77

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

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Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m <sup>3</sup> (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/m <sup>3</sup> (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**

No information available.

**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

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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 cm<sup>2</sup>

### Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor use



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Room size : 20 m<sup>3</sup>  
Temperature : 25 °C  
Ventilation rate per hour : 0,6

Release area : 10 m<sup>2</sup>

**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 cm<sup>2</sup>

**Other given operational conditions affecting consumers exposure**

Outdoor / Indoor : Indoor use  
Room size : 34 m<sup>3</sup>  
Temperature : 25 °C  
Ventilation rate per hour : 1,5

Room height : 2,25 m

**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**

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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 cm<sup>2</sup>

**Other given operational conditions affecting consumers exposure**

Outdoor / Indoor : Indoor use  
Temperature : 25 °C  
Ventilation rate per hour : 0,5

Release area : 20 cm<sup>2</sup>

**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 m<sup>3</sup>  
Temperature : 25 °C  
Ventilation rate per hour : 0,6

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**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 cm<sup>2</sup>

**Other given operational conditions affecting consumers exposure**

Outdoor / Indoor : Indoor use

Room size : 58 m<sup>3</sup>

Temperature : 25 °C

Ventilation rate per hour : 0,5

Release area : 22 m<sup>2</sup>

**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)**

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Route of exposure and type of effects	Exposure estimate	RCR
inhalative	0,72 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	0,10
dermal	2,77 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,05
oral	Consexpo v4.1, long-term, systemic, 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
inhalative	0,26 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	0,04
dermal	1,15 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,02
oral	0,13 mg/kg bw/day (Consexpo v4.1, long-term, systemic, 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
inhalative	1,29 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	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
inhalative	3,93 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	0,56
dermal	2,12 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,04
combined routes	Consexpo v4.1	0,60

**8.4. ES 8 Guidance to Downstream User to evaluate whether he**

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**works inside the boundaries set by the Exposure Scenario**

No information available.

**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)**

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**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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**Other operational conditions affecting workers exposure**

Outdoor / Indoor : Indoor use

**Risk Management Measures**

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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 safety 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 cm<sup>2</sup>  
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 cm<sup>2</sup>  
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 safety goggles.

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

**Product characteristics**

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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 distance between the source of emission and the worker is at least 1m.

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**



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Additional good practice advice : Wear safety 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 cm<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

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**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 safety 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 cm<sup>2</sup>

**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 safety 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

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**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<sup>2</sup>

**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 safety 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/m <sup>3</sup> (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/m <sup>3</sup> (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

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combined routes	ECETOC TRA worker v2.0	0,08
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**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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term -	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13

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systemic		
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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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**

No information available.

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

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**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 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 (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 %

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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<sup>2</sup>  
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 cm<sup>2</sup>  
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

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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

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**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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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 safety goggles.

**10.2.5 ES 10 - CS 5: Control of worker exposure: Professional use (Transfer of**



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**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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**Other operational conditions affecting workers exposure**

Outdoor / Indoor : Indoor use

**Risk Management Measures**

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

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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 safety 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 m<sup>3</sup>

**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 distance between the source of emission and the  
worker is at least 1m.

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- 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 safety 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<sup>2</sup>

**Other operational conditions affecting workers exposure**

Outdoor / Indoor : Indoor use

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**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 safety 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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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

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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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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**

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**brushing) (PROC10)**

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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**

No information available.

**11. ES 11: Consumer use; Use in cleaning agents**

**11.1. Title section**

Washing and cleaning products (PC35)

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<b>Environment</b>		
CS1: 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
<b>Consumer</b>		
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<sup>2</sup>

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**Other given operational conditions affecting consumers exposure**

Outdoor / Indoor : Indoor use  
Temperature : 25 °C  
Ventilation rate per hour : 0,5  
  
Release area : 20 cm<sup>2</sup>

**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 cm<sup>2</sup>

**Other given operational conditions affecting consumers exposure**

Outdoor / Indoor : Indoor use  
Room size : 58 m<sup>3</sup>  
Temperature : 25 °C  
Ventilation rate per hour : 0,5  
  
Release area : 10 m<sup>2</sup>

**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)**



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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 cm<sup>2</sup>

**Other given operational conditions affecting consumers exposure**

Outdoor / Indoor : Indoor use  
Room size : 15 m<sup>3</sup>  
Temperature : 25 °C  
Ventilation rate per hour : 2,5  
Room height : 2,5 m

**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 Mixture/Article : <= 5 %

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**

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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 cm<sup>2</sup>

**Other given operational conditions affecting consumers exposure**

Outdoor / Indoor : Indoor use  
Room size : 15 m<sup>3</sup>  
Temperature : 25 °C  
Ventilation rate per hour : 2,5

Release area : 17100 cm<sup>2</sup>

**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 cm<sup>2</sup>

**Other given operational conditions affecting consumers exposure**

Outdoor / Indoor : Indoor use  
Temperature : 25 °C  
Ventilation rate per hour : 1,0

Release area : 20 cm<sup>2</sup>

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**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 cm<sup>2</sup>

**Other given operational conditions affecting consumers exposure**

Outdoor / Indoor : Indoor use  
Room size : 58 m<sup>3</sup>  
Temperature : 25 °C  
Ventilation rate per hour : 0,5

Release area : 22 m<sup>2</sup>

**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	Exposure estimate	RCR
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of effects		
inhalative	0,01 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	0,001
dermal	0,03 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,0006
oral	Consexpo v4.1, long-term, systemic, 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
inhalative	0,61 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	0,09
dermal	11,70 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,22
oral	Consexpo v4.1, long-term, systemic, 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
inhalative	0,000011 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	
dermal	0,01 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,0002
oral	0,0006 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	
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
inhalative	0,11 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	0,02
dermal	0,12 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,002
oral	Consexpo v4.1, long-term, systemic, 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
inhalative	0,01 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	0,001

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dermal	0,04 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,0008
oral	Consexpo v4.1, long-term, systemic, 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
inhalative	0,38 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	0,05
dermal	7,31 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,14
oral	Consexpo v4.1, long-term, systemic, 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**

No information available.

**12. ES 12: Industrial use; Use in lubricants**

**12.1. Title section**

<b>Environment</b>		
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
<b>Workers</b>		
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

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CS11: Industrial use (Lubrication at high energy conditions in metal working operations, General greasing/lubrication at high kinetic energy conditions)	PROC17, PROC18
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## 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 cm<sup>2</sup>

#### 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 safety 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)

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**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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>  
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 cm<sup>2</sup>

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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 safety 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 cm<sup>2</sup>

**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 safety goggles.

**12.2.6 ES 12 - CS 6: Control of worker exposure: Industrial use (Industrial spraying) (PROC7)**

**Product characteristics**

Concentration of the Substance in : <= 100 %



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Mixture/Article

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 m<sup>3</sup>

**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 distance between the source of emission and the worker is at least 1m.

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 safety goggles.

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**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<sup>2</sup>

**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 safety 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.

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Covers skin contact area up to : 480 cm<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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 safety 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**

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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<sup>2</sup>

**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 safety 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<sup>2</sup>

**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 %

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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 safety 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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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

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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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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

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**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/m <sup>3</sup> (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/m <sup>3</sup> (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

**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/m <sup>3</sup> (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/m <sup>3</sup> (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

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**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/m <sup>3</sup> (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/m <sup>3</sup> (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**

No information available.

**13. ES 13: Industrial use; Metal working fluids**

**13.1. Title section**

<b>Environment</b>		
CS1: Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article))		ERC4
<b>Workers</b>		
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



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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 cm<sup>2</sup>

#### 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 safety goggles.

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**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 cm<sup>2</sup>

**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 safety 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 cm<sup>2</sup>  
Remarks : Manufacture or formulation in the chemical industry in closed

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Dermal exposure : batch processes with occasional controlled exposure or processes with equivalent containment condition  
: Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.  
Covers skin contact area up to : 480 cm<sup>2</sup>  
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 safety 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<sup>2</sup>

**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 safety goggles.

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**13.2.6 ES 13 - CS 6: Control of worker exposure: Industrial use (Industrial spraying) (PROCT)**

**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 m<sup>3</sup>

**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 distance between the source of emission and the worker is at least 1m.

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 : Ensure regular inspection, cleaning and maintenance of

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prevent /limit releases, dispersion and exposure equipment and machines.

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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 cm<sup>2</sup>

**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 safety 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

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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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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 safety 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 %

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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<sup>2</sup>

**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 safety 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<sup>2</sup>

**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

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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 safety 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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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



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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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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

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**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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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

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**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/m <sup>3</sup> (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**

No information available.

**14. ES 14: Professional use; Metal working fluids**

**14.1. Title section**

<b>Environment</b>		
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
<b>Workers</b>		
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

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## 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 cm<sup>2</sup>  
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 cm<sup>2</sup>  
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

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**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

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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 cm<sup>2</sup>

**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 safety 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

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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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**Other operational conditions affecting workers exposure**

Outdoor / Indoor : Indoor use

**Risk Management Measures**

Note : No specific measures identified.

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**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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 cm<sup>2</sup>

**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 safety 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

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**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 distance between the source of emission and the worker is at least 1m.

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.



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**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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 cm<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**Other operational conditions affecting workers exposure**

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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 safety 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/m <sup>3</sup> (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/m <sup>3</sup> (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

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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/m <sup>3</sup> (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

**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/m <sup>3</sup> (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/m <sup>3</sup> (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
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Worker - inhalative, long-term - local and systemic	25,88 mg/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term -	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01

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systemic		
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 - local and systemic	12,94 mg/m <sup>3</sup> (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

**14.4. ES 14 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

No information available.

**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

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## 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 cm<sup>2</sup>  
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 cm<sup>2</sup>  
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

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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 safety 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 cm<sup>2</sup>

**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 safety 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.

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Covers skin contact area up to : 960 cm<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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 safety 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 : <= 100 %



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Mixture/Article

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 distance between the source of emission and the worker is at least 1m.

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

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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 safety 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<sup>2</sup>

**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 safety 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)**

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Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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

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**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 of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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

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## 15.4. ES 15 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

No information available.

## 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 %

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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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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.

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**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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 cm<sup>2</sup>  
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 cm<sup>2</sup>  
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 safety 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

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**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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>  
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<sup>2</sup>

**Other operational conditions affecting workers exposure**



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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 safety 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/m <sup>3</sup> (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/m <sup>3</sup> (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	Exposure estimate	RCR
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of effects		
Worker - inhalative, long-term - local and systemic	7,76 mg/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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

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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 mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m <sup>3</sup> (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/m <sup>3</sup> (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**

No information available.

**17. ES 17: Professional use; Use in functional fluids**

**17.1. Title section**

<b>Environment</b>		
CS1:	Professional use (Widespread use of functional fluid (indoor), Widespread use of functional fluid (outdoor))	ERC9a, ERC9b
<b>Workers</b>		
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	PROC4

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arises)		
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 cm<sup>2</sup>  
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 cm<sup>2</sup>  
Remarks : Chemical production or refinery in closed continuous process

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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

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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 cm<sup>2</sup>

**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 safety goggles.

**17.2.4 ES 17 - CS 4: Control of worker exposure: Professional use (Transfer of**

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**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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**Other operational conditions affecting workers exposure**

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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 safety 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 cm<sup>2</sup>

**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 safety 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)**

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Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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



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**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 of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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**

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## 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<sup>2</sup>

#### 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)**

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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/m <sup>3</sup> (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**

No information available.

**19. ES 19: Professional use; Anti-freeze and de-icing products**

**19.1. Title section**

<b>Environment</b>		
CS1: Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor))		ERC8d
<b>Workers</b>		
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		PROC8b

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(charging/discharging) at dedicated facilities)  
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 cm<sup>2</sup>  
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 cm<sup>2</sup>  
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

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**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 safety 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 cm<sup>2</sup>

**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 safety 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 %

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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<sup>2</sup>

**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 safety 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 m<sup>3</sup>

**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 %

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- 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 distance between the source of emission and the worker is at least 1m.
- 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 safety 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	0,03 mg/m <sup>3</sup> (ECETOC TRA worker v2.0, Chemical	0,0007

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- local and systemic	production or refinery in closed process without likelihood 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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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)**



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**(PROC11)**

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m <sup>3</sup> (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)**

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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 cm<sup>2</sup>

**Other given operational conditions affecting consumers exposure**

Outdoor / Indoor : Indoor use  
Room size : 58 m<sup>3</sup>  
Temperature : 25 °C  
Ventilation rate per hour : 0,5  
Room height : 2,5 m

**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

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**Human factors not influenced by risk management**

Dermal exposure : Palm of one hand  
Covers skin contact area up to : 215 cm<sup>2</sup>

**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 cm<sup>2</sup>

**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
inhalative	0,0006 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	0,0001
dermal	0,50 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,009
oral	0,005 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	
combined routes	Consexpo v4.1	0,009

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**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
inhalative	long-term, local, systemic, Not applicable	
Chronic dermal systemic exposure	4,46 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,08
Consumer - oral, long-term - systemic	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/m <sup>3</sup> (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

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## 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<sup>2</sup>

#### 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 safety 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
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Worker - inhalative, long-term - local and systemic	0,03 mg/m <sup>3</sup> (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

No information available.

## 22. ES 22: Industrial use; Use in water treatment agents

### 22.1. Title section

<b>Environment</b>		
CS1: Industrial use (Formulation into solid matrix, Use of non-reactive processing aid at industrial site (no inclusion into or onto article))		ERC3, ERC4
<b>Workers</b>		
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.

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**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 cm<sup>2</sup>

**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 safety 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 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<sup>2</sup>

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**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 safety 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 cm<sup>2</sup>  
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 cm<sup>2</sup>  
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 safety goggles.



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**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<sup>2</sup>

**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 safety 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 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<sup>2</sup>

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**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 safety 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 cm<sup>2</sup>

**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 safety 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)**

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Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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

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**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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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**

No information available.

**23. ES 23: Consumer use; Adhesives, sealants**

**23.1. Title section**

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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 cm<sup>2</sup>

#### Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor use  
Room size : 58 m<sup>3</sup>  
Temperature : 25 °C  
Ventilation rate per hour : 0,5

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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
inhalative	4,1 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	0,59
dermal	0,26 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,005
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**

<b>Environment</b>		
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
<b>Workers</b>		
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		PROC3, PROC4

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	processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	
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 cm<sup>2</sup>

#### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor use

#### Risk Management Measures

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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 safety 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 cm<sup>2</sup>

**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 safety 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**



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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<sup>2</sup>  
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 cm<sup>2</sup>  
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 safety 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 cm<sup>2</sup>

**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

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Effectiveness (of a measure) : combination with specific activity training.  
: 90 %

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety goggles.

**24.2.6 ES 24 - CS 6: Control of worker exposure: Industrial use (Industrial spraying) (PROCT7)**

**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 m<sup>3</sup>

**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 distance between the source of emission and the worker is at least 1m.

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

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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 safety 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<sup>2</sup>

**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 safety 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 %

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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<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**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 safety goggles.

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**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 cm<sup>2</sup>

**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 safety 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 cm<sup>2</sup>

**Other operational conditions affecting workers exposure**

Outdoor / Indoor : Indoor use

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**Risk Management Measures**

Note : No specific measures identified.

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Additional good practice advice : Wear safety 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 cm<sup>2</sup>

**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 safety 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	0,03 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0,0007

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- local and systemic		
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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (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)**

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Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m <sup>3</sup> (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/m <sup>3</sup> (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 - local and systemic	2,59 mg/m <sup>3</sup> (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

**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/m <sup>3</sup> (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/m <sup>3</sup> (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37



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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/m <sup>3</sup> (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 - local and systemic	25,87 mg/m <sup>3</sup> (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

**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/m <sup>3</sup> (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	12,94 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0,37

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- local and systemic		
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

No information available.

## 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

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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<sup>2</sup>

Breathing volume : 1,5 m<sup>3</sup>/day

**Other given operational conditions affecting consumers exposure**

Outdoor / Indoor : Indoor use

Room size : 57,5 m<sup>3</sup>

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
inhalative	0,06 mg/m <sup>3</sup> (Consexpo v4.1, long-term, local, systemic)	0,009
dermal	0,007 mg/kg bw/day (Consexpo v4.1, long-term, systemic)	0,0008
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

No information available.