

ANTIFROGEN N

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Substance key: SXR024717

Revision Date: 02.02.2016

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

1.1. Product identifier

Trade name

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Material number: 107601

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)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Acute toxicity, Category 4

H302: Harmful if swallowed.

Specific target organ toxicity - repeated exposure, Category 2

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

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :



Signal word : Warning

Hazard statements : H302 Harmful if swallowed.

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	H373	May cause damage to organs through prolonged or repeated exposure.
Precautionary statements	Prevention: P260 P264 P280	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray. Wash skin thoroughly after handling. Wear protective gloves/ protective clothing/ eye protection/ face protection.
	Response: P314 P337 + P313	Get medical advice/ attention if you feel unwell. If eye irritation persists: Get medical advice/ attention.
	Disposal: P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Other hazards

After consideration of all available toxicity and ecotoxicity data it is concluded that the substance does not fulfil the PBT or vPvB criteria.

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

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Hazardous components

Chemical name	CAS-No. EC-No. Registration number	Classification	Concentration (% w/w)
Ethanediol	107-21-1 203-473-3 01-2119456816-28 01-2119456816-28-0000 01-2119456816-28-0003 01-2119456816-28-XXXX	Acute Tox. 4; H302 STOT RE 2; H373 Acute Tox. 4; H302 STOT RE 2; H373	>= 90 - <= 95

For explanation of abbreviations see section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

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

If inhaled : Get medical attention if symptoms occur.

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- In case of skin contact : In case of contact, immediately flush skin with plenty of water.
- In case of eye contact : In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- If swallowed : Get medical attention immediately.

4.2 Most important symptoms and effects, both acute and delayed

- Symptoms : No symptoms known currently.
- Risks : No hazards known at this time.

4.3 Indication of any immediate medical attention and special treatment needed

- Treatment : Treat symptomatically.

SECTION 5: Firefighting measures

5.1 Extinguishing media

- Suitable extinguishing media : Water spray jet
Alcohol-resistant foam
Carbon dioxide (CO₂)
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_x)

5.3 Advice for firefighters

- Special protective equipment for firefighters : Self-contained breathing apparatus

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).

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

6.4 Reference to other sections

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

SECTION 7: Handling and storage

7.1 Precautions for safe handling

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

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

Hygiene measures : Keep away from food and drink.

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

7.3 Specific end use(s)

Specific use(s) : No further recommendations.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
Ethanediol	107-21-1	TWA	20 ppm 52 mg/m ³	2000/39/EC
Further information	Identifies the possibility of significant uptake through the skin, Indicative			
		STEL	40 ppm 104 mg/m ³	2000/39/EC
Further information	Identifies the possibility of significant uptake through the skin, Indicative			

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

ethanediol : End Use: Workers
CAS-No.: 107-21-1 Exposure routes: Dermal
Potential health effects: Long-term systemic effects
Value: 106 mg/kg bw/day
DNEL
End Use: Workers
Exposure routes: Inhalation

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Potential health effects: Long-term local effects

Value: 35 mg/m³

DNEL

End Use: General population

Exposure routes: Dermal

Potential health effects: Long-term systemic effects

Value: 53 mg/kg bw/day

DNEL

End Use: General population

Exposure routes: Inhalation

Potential health effects: Long-term local effects

Value: 7 mg/m³

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

ethanediol : Fresh water
CAS-No.: 107-21-1 Value: 10 mg/l
salt water
Value: 1 mg/l
Water (intermittent release)
Value: 10 mg/l
Fresh water sediment
Value: 20,9 mg/kg dry weight (d.w.)
Soil
Value: 1,53 mg/kg dry weight (d.w.)
Sewage treatment plant
Value: 199,5 mg/l

8.2 Exposure controls

Personal protective equipment

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

Hand protection

Break through time : 480 min

Glove thickness : 0,7 mm

Remarks : Long-term exposure Impervious butyl rubber gloves

Break through time : 30 min

Glove thickness : 0,4 mm

Remarks : For short-term exposure (splash protection): Nitrile rubber gloves.

Remarks : These types of protective gloves are offered by various manufacturers. Please note the manufacturers' detailed statements, especially about the minimum thickness and the minimum breakthrough time. Consider also the particular working conditions under which the gloves are being used.

Respiratory protection : Use respiratory protection in case of insufficient exhaust ventilation or prolonged exposure
Full mask to standard DIN EN 136
Filter A (organic gases and vapours) to standard DIN EN 141

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The use of filter apparatus presupposes that the environment atmosphere contains at least 17% oxygen by volume, and does not exceed the maximum gas concentration, usually 0.5% by volume. Relevant guidelines to be considered include EN 136/141/143/371/372 as well as other national regulations.

Protective measures : Do not inhale vapours
Avoid contact with skin and eyes.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance : Liquid

Particle size : Not applicable

Colour : yellow

Odour : slightly perceptible

Odour Threshold : not tested.

pH : approx. 8
Concentration: 100 g/l (20 °C)
Method: DIN 19268

Melting point : -32 °C
Method: DIN 51583

Boiling point : approx. 165 °C
(1.013 hPa)
Method: ASTM D 1120

166 °C
(1.013 hPa)
Method: ASTM D 1120

Flash point : 119 °C
Method: ASTM D6450 (closed cup)

Evaporation rate : not tested.

Upper explosion limit : not tested.

Lower explosion limit : 3 %(V)
Data relate to solvent

Combustion number : Not applicable

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Vapour pressure	: < 0,01 kPa (20 °C) Method: Calculated by Syracuse.
Relative vapour density	: not tested.
Density	: 1,1138 g/cm ³ (20 °C) Method: DIN 51757
Bulk density	: Not applicable
Solubility(ies) Water solubility	: completely miscible (20 °C)
Solubility in other solvents	: not tested. Solvent: fat
Partition coefficient: n- octanol/water	: Not applicable
Auto-ignition temperature	: > 400 °C Method: DIN 51794
Decomposition temperature	: > 300 °C Method: DSC Measurement under nitrogen No decomposition up to 300 °C.
Viscosity Viscosity, dynamic	: 20,3 mPa.s (20 °C)
Viscosity, kinematic	: 20,3 mm ² /s (20 °C) Method: DIN 51562
Explosive properties	: Not explosive Method: Expert judgement
Oxidizing properties	: The substance or mixture is not classified as oxidizing. Method: Expert judgement

9.2 Other information

Surface tension	: 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 alkalis.
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

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product:

Acute oral toxicity : Acute toxicity estimate: 519,54 mg/kg
Method: Calculation method

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

Components:

Ethanediol:

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

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

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GLP: yes

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

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: BASF test
Result: No skin irritation
GLP: no

Serious eye damage/eye irritation

Product:

Remarks: not tested.

Components:

Ethanediol:

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

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

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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
Species: Salmonella typhimurium
Concentration: 33 - 5000 µg/plate
Metabolic activation: with and without
Method: OECD Test Guideline 471
Result: negative
GLP: yes

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

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

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

Carcinogenicity

Product:

Carcinogenicity -
Assessment : No evidence of carcinogenicity in animal studies.

Information refers to the main component.

Components:

Ethanediol:

Carcinogenicity - : Not classifiable as a human carcinogen.

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Assessment

Reproductive toxicity

Product:

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

No reproductive toxicity to be expected.

Information refers to the main component.

Information refers to the main component.

Components:

Ethanediol:

Effects on fertility

: Species: Rat
Sex: male and female
Dose: 40 - 200 - 1000
Frequency of Treatment: daily
Fischer F344
Application Route: oral (feed)
Test period: 3 generations
NOAEL: > 1.000 mg/kg,
F1: > 1.000 mg/kg,
F2: > 1.000 mg/kg,
Method: Other
GLP: no

Effects on foetal development

: Species: Rat
Application Route: oral (gavage)
Exposure time: gestation day 6-15
Dose: 150 - 500 - 1000 - 2500 mg/kg
Group: yes
500 mg/kg
1.000 mg/kg
Number of exposures: daily
Method: Other
GLP: yes

Reproductive toxicity - Assessment

: No reproductive toxicity to be expected.
No teratogenic effects to be expected.

STOT - single exposure

Product:

Remarks: not tested.

Components:

Ethanediol:

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

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STOT - repeated exposure

Product:

Remarks: not tested.

Components:

Ethanediol:

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

Species: Rat, male

NOAEL: 150 mg/kg

Application Route: oral (feed)

Method: OECD Test Guideline 408

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

Application Route: oral (feed)

Exposure time: 16 w

Number of exposures: daily

Dose: 50 - 150 - 500 - 1000 mg/kg

Group: yes

Method: OECD Test Guideline 408

GLP: yes

Species: Dog, male

NOAEL: ca. 2.200 mg/kg

Application Route: Skin contact

Exposure time: 4 w

Number of exposures: daily

Dose: 0,5 - 2 - 8 ml/kg

Group: yes

Method: OECD Test Guideline 410

GLP: yes

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Aspiration toxicity

Product:

no data available

Components:

Ethanediol:

No aspiration toxicity classification

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.

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 : EC50 (Selenastrum capricornutum (green algae)): 6.500 - 13.000 mg/l
Exposure time: 96 h
Remarks: Information refers to the main component.
- Toxicity to bacteria : 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

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- Exposure time: 96 h
Test Type: static test
Analytical monitoring: yes
Method: EPA
GLP: no
Remarks: The details of the toxic effect relate to the nominal concentration.
- Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 100 mg/l
Exposure time: 48 h
Test Type: static test
Analytical monitoring: yes
Method: OECD Test Guideline 202
GLP: yes
- Toxicity to algae : EC50 (Chlamydomonas angulosa. Green algae): 3.536 mg/l
Exposure time: 96 h
Analytical monitoring: no
Method: Estimated (Ecosar)
GLP: no
- Toxicity to bacteria : EC20 (activated sludge, domestic): > 1.995 mg/l
End point: Bacteria toxicity (respiration inhibition)
Exposure time: 0,5 h
Analytical monitoring: no
Method: ISO 8192
GLP: no
Remarks: By analogy with a product of similar composition
- Toxicity to fish (Chronic toxicity) : Chronic Toxicity Value: 2.629 mg/l
Exposure time: 30 d
End point: Other
Species: Fish
Method: Other
GLP: no
Remarks: The details of the toxic effect relate to the nominal concentration.
- Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC: 8.590 mg/l
Exposure time: 7 d
End point: Reproduction rate
Species: Ceriodaphnia spec.
Test Type: semi-static test
Analytical monitoring: yes
Method: Other
GLP: No information available.
Remarks: The details of the toxic effect relate to the nominal concentration.
- Toxicity to soil dwelling organisms :
Remarks: The study is not necessary from a scientific perspective.
- Plant toxicity : Remarks: The study is not necessary from a scientific

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perspective.

Sediment toxicity : Remarks: The study is not necessary from a scientific perspective.

Toxicity to terrestrial organisms : Remarks: The study is not necessary from a scientific perspective.

12.2 Persistence and degradability

Product:

Biodegradability : 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: DOC decrease
Exposure time: 10 d
Method: OECD Test Guideline 301A
GLP: yes

12.3 Bioaccumulative potential

Product:

Bioaccumulation : Remarks: not tested.

Components:

Ethanediol:

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

12.4 Mobility in soil

Product:

Distribution among environmental compartments : Remarks: not tested.

Components:

Ethanediol:

Distribution among environmental compartments : Adsorption/Soil
Medium:water - soil

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log Koc: 0
Method: other (calculated)

12.5 Results of PBT and vPvB assessment

Product:

Assessment : After consideration of all available toxicity and ecotoxicity data it is concluded that the substance does not fulfil the PBT or vPvB criteria.

Remarks: Information refers to the main component.

Components:

Ethanediol:

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

12.6 Other adverse effects

Product:

Additional ecological information : Remarks: 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 : Remarks: Do not allow to enter ground water, waterways or waste water.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Dispose of in accordance with local regulations.

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

SECTION 14: Transport information

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Section 14.1. to 14.5.

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

14.6. Special precautions for user

See sections 6 to 8 of this Safety Data Sheet.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code (International Bulk Chemicals Code)

No transport as bulk according IBC - Code.

SECTION 15: Regulatory information

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

- Volatile organic compounds : Directive 1999/13/EC on the limitation of emissions of volatile organic compounds
Remarks: According to the composition the product contains no VOC component as defined by Directive 1999/13/EC.
- Directive 2004/42/EC
Remarks: 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.

15.2 Chemical safety assessment

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

SECTION 16: Other information

Full text of H-Statements

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

Full text of other abbreviations

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

Further information

- Other information : Observe national and local legal requirements

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Exposure Scenario(s)

Number	Title
ES 1	Industrial use; Use as an intermediate PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15 - ERC6a Ethane-1,2-diol
ES 2	Industrial use; Industrial use of processing aids in processes and products, not becoming part of articles PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC13, PROC14, PROC15 - ERC4 Ethane-1,2-diol
ES 3	Industrial use; Distribution of substance PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15 - ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 Ethane-1,2-diol
ES 4	Industrial use; Formulation [mixing] of preparations and/or re-packaging PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15 - ERC2 Ethane-1,2-diol
ES 5	Industrial use; Use in polymer production PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC15 - ERC6c Ethane-1,2-diol
ES 6	Industrial use; Paints, pastels, pigment powders, Coatings PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC10, PROC13, PROC15 - ERC4 Ethane-1,2-diol
ES 7	Professional use; Paints, pastels, pigment powders, Coatings, Adhesives, sealants, Foaming, Use in polymer processing PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC14, PROC15, PROC19 - ERC8a, ERC8c, ERC8d, ERC8f Ethane-1,2-diol
ES 8	Consumer use; Coatings and paints, thinners, paint removers, Surface treatment PC9a, PC15, PC18, PC31, PC24, PC34 - ERC8a, ERC8c, ERC8d, ERC8f Ethane-1,2-diol
ES 9	Industrial use; Use in cleaning agents PROC1, PROC2, PROC3, PROC4, PROC7, PROC8a, PROC8b, PROC10, PROC13 - ERC4 Ethane-1,2-diol
ES 10	Professional use; Use in cleaning agents

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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; Laboratory use

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

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

1.1. Titles of Contributing scenarios (CS)

Environment		
CS1:	Industrial use (Industrial use resulting in manufacture of another substance (use of intermediates))	ERC6a
Workers		
CS2:	Industrial use (Use in closed process, no likelihood of exposure)	PROC1
CS3:	Industrial use (Use in closed, continuous process with occasional controlled exposure)	PROC2
CS4:	Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))	PROC5
CS6:	Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS7:	Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	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 (Industrial use resulting in manufacture of another substance (use of intermediates)) (ERC6a)

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Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

1.2.2 ES 1 - CS 2: Control of worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (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
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

1.2.3 ES 1 - CS 3: Control of worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (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

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Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use in closed, continuous process with occasional controlled exposure
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

1.2.4 ES 1 - CS 4: Control of worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in batch and other process (synthesis) where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed batch process (synthesis or formulation)

Note : Use in batch and other process (synthesis) where opportunity for exposure arises
No specific measures identified.

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Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

1.2.5 ES 1 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

1.2.6 ES 1 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

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Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

1.2.7 ES 1 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

Product characteristics

Concentration of the Substance in 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 : Palm of both hands
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

1.3. ES 1 Exposure estimation and reference to its source

1.3.2 ES 1 - CS 2: Worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

1.3.3 ES 1 - CS 3: Worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,07

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Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,08

1.3.4 ES 1 - CS 4: Worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,43

1.3.5 ES 1 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,38

1.3.6 ES 1 - CS 6: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities) (PROC8a)

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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,20

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

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,37

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

ECHA guidance for downstream users
Section 2

2. ES 2: Industrial use; Industrial use of processing aids in processes and products, not becoming part of articles

2.1. Titles of Contributing scenarios (CS)

Environment		
CS1:	Industrial use (Industrial use of processing aids in processes and products, not becoming part of articles)	ERC4
Workers		
CS2:	Industrial use (Use in closed process, no likelihood of exposure)	PROC1
CS3:	Industrial use (Use in closed, continuous process with occasional controlled exposure)	PROC2
CS4:	Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))	PROC5
CS6:	Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS7:	Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS8:	Industrial use (Treatment of articles by dipping and pouring)	PROC13
CS9:	Industrial use (Production of preparations or articles by tableting, compression, extrusion, pelettisation)	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 (Industrial use of processing aids in processes and products, not becoming part of articles) (ERC4)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

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Product characteristics

Concentration of the Substance in Mixture/Article : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed., The use is assessed to be safe.

2.2.2 ES 2 - CS 2: Control of worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (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
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

2.2.3 ES 2 - CS 3: Control of worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (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

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Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use in closed, continuous process with occasional controlled exposure
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

2.2.4 ES 2 - CS 4: Control of worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in batch and other process (synthesis) where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed batch process (synthesis or formulation)

Note : Use in batch and other process (synthesis) where opportunity for exposure arises
No specific measures identified.

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Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

2.2.5 ES 2 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

2.2.6 ES 2 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

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Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

2.2.7 ES 2 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

Product characteristics

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

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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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

2.2.9 ES 2 - CS 9: Control of worker exposure: Industrial use (Production of preparations or articles by tableting, compression, extrusion, pelettisation) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

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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

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 : Palm of both hands
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

2.3. ES 2 Exposure estimation and reference to its source

2.3.2 ES 2 - CS 2: Worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

2.3.3 ES 2 - CS 3: Worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (PROC2)

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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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,08

2.3.4 ES 2 - CS 4: Worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,43

2.3.5 ES 2 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,38

2.3.6 ES 2 - CS 6: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated

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facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,20

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

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,75

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all exposure routes)		
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2.3.9 ES 2 - CS 9: Worker exposure: Industrial use (Production of preparations or articles by tableting, compression, extrusion, pelettisation) (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	3,43 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,37

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

ECHA guidance for downstream users
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3. ES 3: Industrial use; Distribution of substance

3.1. Titles of Contributing scenarios (CS)

Environment	
CS1: Industrial use (Manufacture of substances, Formulation of preparations, Formulation in materials, Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use resulting in inclusion into or onto a matrix, Industrial use resulting in manufacture of another substance (use of intermediates), Industrial use of reactive processing aids, Industrial use of monomers for manufacture of thermoplastics, Industrial use of process regulators for polymerisation	ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7

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processes in production of resins, rubbers, polymers, Industrial use of substances in closed systems)	
Workers	
CS2: Industrial use (Use in closed process, no likelihood of exposure)	PROC1
CS3: Industrial use (Use in closed, continuous process with occasional controlled exposure)	PROC2
CS4: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises)	PROC3, PROC4
CS5: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS6: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS7: Industrial use (Use as laboratory reagent)	PROC15

3.2. ES 3 Conditions of use affecting exposure

3.2.1 ES 3 - CS 1: Control of environmental exposure: Industrial use (Manufacture of substances, Formulation of preparations, Formulation in materials, Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use resulting in inclusion into or onto a matrix, Industrial use resulting in manufacture of another substance (use of intermediates), Industrial use of reactive processing aids, Industrial use of monomers for manufacture of thermoplastics, Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers, Industrial use of substances in closed systems) (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.
The use is assessed to be safe.

3.2.2 ES 3 - CS 2: Control of worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (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
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

3.2.3 ES 3 - CS 3: Control of worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use in closed, continuous process with occasional controlled exposure
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

3.2.4 ES 3 - CS 4: Control of worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where

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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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in batch and other process (synthesis) where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed batch process (synthesis or formulation)

Note : Use in batch and other process (synthesis) where opportunity for exposure arises
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

3.2.5 ES 3 - CS 5: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands

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Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

3.2.6 ES 3 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

Product characteristics

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

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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 : Palm of both hands
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

3.3. ES 3 Exposure estimation and reference to its source

3.3.2 ES 3 - CS 2: Worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

3.3.3 ES 3 - CS 3: Worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,07

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- local and systemic	version)	
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,08

3.3.4 ES 3 - CS 4: Worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,43

3.3.5 ES 3 - CS 5: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,20

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

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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 ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	0,43

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

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,37

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

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

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4.1. Titles of Contributing scenarios (CS)

Environment	
CS1: Industrial use (Formulation of preparations)	ERC2
Workers	
CS2: Industrial use (Use in closed process, no likelihood of exposure)	PROC1
CS3: Industrial use (Use in closed, continuous process with occasional controlled exposure)	PROC2
CS4: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises)	PROC3, PROC4
CS5: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))	PROC5
CS6: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS7: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS8: Industrial use (Production of preparations or articles by tableting, compression, extrusion, pelettisation)	PROC14
CS9: Industrial use (Use as laboratory reagent)	PROC15

4.2. ES 4 Conditions of use affecting exposure

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

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

4.2.2 ES 4 - CS 2: Control of worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

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 : Palm of one hand
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

4.2.3 ES 4 - CS 3: Control of worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use in closed, continuous process with occasional controlled exposure
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

4.2.4 ES 4 - CS 4: Control of worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises) (PROC3, PROC4)

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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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in batch and other process (synthesis) where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed batch process (synthesis or formulation)

Note : Use in batch and other process (synthesis) where opportunity for exposure arises
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

4.2.5 ES 4 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

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Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

4.2.6 ES 4 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

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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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

4.2.8 ES 4 - CS 8: Control of worker exposure: Industrial use (Production of preparations or articles by tableting, compression, extrusion, pelettisation) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

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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 : Palm of both hands
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

4.3. ES 4 Exposure estimation and reference to its source

4.3.2 ES 4 - CS 2: Worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

4.3.3 ES 4 - CS 3: Worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (PROC2)

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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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,08

4.3.4 ES 4 - CS 4: Worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,43

4.3.5 ES 4 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,38

4.3.6 ES 4 - CS 6: Worker exposure: Industrial use (Transfer of substance or

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preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,20

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

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	0,43

4.3.8 ES 4 - CS 8: Worker exposure: Industrial use (Production of preparations or articles by tableting, compression, extrusion, pelettisation) (PROC14)

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

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Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,40
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4.3.9 ES 4 - CS 9: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,37

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

ECHA guidance for downstream users
Section 2

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

5.1. Titles of Contributing scenarios (CS)

Environment		
CS1: Industrial use (Industrial use of monomers for manufacture of thermoplastics)		ERC6c
Workers		
CS2: Industrial use (Use in closed process, no likelihood of exposure)		PROC1
CS3: Industrial use (Use in closed, continuous process with occasional controlled exposure)		PROC2
CS4: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises)		PROC3, PROC4
CS5: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))		PROC5
CS6: Industrial use (Calendering operations)		PROC6
CS7: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)		PROC8a
CS8: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))		PROC8b, PROC9
CS9: Industrial use (Use as laboratory reagent)		PROC15

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5.2. ES 5 Conditions of use affecting exposure

5.2.1 ES 5 - CS 1: Control of environmental exposure: Industrial use (Industrial use of monomers for manufacture of thermoplastics) (ERC6c)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

5.2.2 ES 5 - CS 2: Control of worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (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
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

5.2.3 ES 5 - CS 3: Control of worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use in closed, continuous process with occasional controlled exposure
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

5.2.4 ES 5 - CS 4: Control of worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in batch and other process (synthesis) where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

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Risk management measures

Technical conditions and measures : Use in closed batch process (synthesis or formulation)

Note : Use in batch and other process (synthesis) where opportunity for exposure arises
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

5.2.5 ES 5 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

5.2.7 ES 5 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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5.2.8 ES 5 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

Product characteristics

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

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

Amount used

Storage : < 1 kg, < 1 l

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

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Outdoor / Indoor : Indoor

Risk management measures

Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

5.3. ES 5 Exposure estimation and reference to its source

5.3.2 ES 5 - CS 2: Worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

5.3.3 ES 5 - CS 3: Worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,08

5.3.4 ES 5 - CS 4: Worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or	0,22

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	formulation))	
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,43

5.3.5 ES 5 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,40

5.3.7 ES 5 - CS 7: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07

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Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,20

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

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,37

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

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6. ES 6: Industrial use; Paints, pastels, pigment powders, Coatings

6.1. Titles of Contributing scenarios (CS)

Environment		
CS1: Industrial use (Industrial use of processing aids in processes and products, not becoming part of articles)		ERC4
Workers		
CS2: Industrial use (Use in closed process, no likelihood of exposure)		PROC1
CS3: Industrial use (Use in closed, continuous process with occasional controlled exposure)		PROC2
CS4: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises)		PROC3, PROC4
CS5: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))		PROC5
CS6: Industrial use (Spraying in industrial settings and applications)		PROC7
CS7: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)		PROC8a
CS8: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 (Industrial use of processing aids in processes and products, not becoming part of articles) (ERC4)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

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6.2.2 ES 6 - CS 2: Control of worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (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
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

6.2.3 ES 6 - CS 3: Control of worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use in closed, continuous process with occasional controlled

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exposure
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

6.2.4 ES 6 - CS 4: Control of worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in batch and other process (synthesis) where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed batch process (synthesis or formulation)

Note : Use in batch and other process (synthesis) where opportunity for exposure arises
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

6.2.5 ES 6 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (PROC5)

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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

6.2.6 ES 6 - CS 6: Control of worker exposure: Industrial use (Spraying in industrial settings and applications) (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

Human factors not influenced by risk management

Dermal exposure : Whole body

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
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

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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 working clothes.

Effectiveness (of a measure) : 80 %

Effectiveness (of a measure) : 80 %

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the distance from worker to task is greater than 1 m.

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that direction of application is only horizontal or downward.

Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of work area

Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of equipment

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

6.2.7 ES 6 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

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Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation exposure
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

6.2.8 ES 6 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

Product characteristics

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

Physical Form (at time of use) : Low volatile liquid

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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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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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 : Palm of both hands
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

6.3. ES 6 Exposure estimation and reference to its source

6.3.2 ES 6 - CS 2: Worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

6.3.3 ES 6 - CS 3: Worker exposure: Industrial use (Use in closed, continuous

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process with occasional controlled exposure) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,08

6.3.4 ES 6 - CS 4: Worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,43

6.3.5 ES 6 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,38

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6.3.6 ES 6 - CS 6: Worker exposure: Industrial use (Spraying in industrial settings and applications) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m ³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
Human health (combined for all exposure routes)	Not applicable	0,80

6.3.7 ES 6 - CS 7: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,20

6.3.8 ES 6 - CS 8: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,03

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Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,77
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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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,37

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

ECHA guidance for downstream users
Section 2

7. ES 7: Professional use; Paints, pastels, pigment powders, Coatings, Adhesives, sealants, Foaming, Use in polymer processing

7.1. Titles of Contributing scenarios (CS)

Environment		
CS1: Professional use (Wide dispersive indoor use of processing aids in open systems, Wide dispersive indoor use resulting in inclusion into or onto a		ERC8a, ERC8c, ERC8d, ERC8f

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matrix, Wide dispersive outdoor use of processing aids in open systems, Wide dispersive outdoor use resulting in inclusion into or onto a matrix)	
Workers	
CS2: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation))	PROC1, PROC2, PROC3
CS3: Professional use (Use in batch and other process (synthesis) where opportunity for exposure arises, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))	PROC4, PROC5
CS4: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS5: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS6: Professional use (Roller application or brushing)	PROC10
CS7: Professional use (Spraying outside industrial settings and/or applications)	PROC11
CS8: Professional use (Treatment of articles by dipping and pouring, Production of preparations or articles by tableting, compression, extrusion, pelettisation)	PROC13, PROC14
CS9: Professional use (Use as laboratory reagent)	PROC15
CS10: Professional use (Hand-mixing with intimate contact and only PPE available)	PROC19

7.2. ES 7 Conditions of use affecting exposure

7.2.1 ES 7 - CS 1: Control of environmental exposure: Professional use (Wide dispersive indoor use of processing aids in open systems, Wide dispersive indoor use resulting in inclusion into or onto a matrix, Wide dispersive outdoor use of processing aids in open systems, Wide dispersive outdoor use resulting in inclusion into or onto a matrix) (ERC8a, ERC8c, ERC8d, ERC8f)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

7.2.2 ES 7 - CS 2: Control of worker exposure: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with

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occasional controlled exposure, Use in closed batch process (synthesis or formulation)) (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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed process, no likelihood of exposure, Use in closed batch process (synthesis or formulation)

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in closed, continuous process with occasional controlled exposure

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Technical conditions and measures : Use in closed, continuous process with occasional controlled exposure

Technical conditions and measures : Use in closed batch process (synthesis or formulation)
With occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

7.2.3 ES 7 - CS 3: Control of worker exposure: Professional use (Use in batch and other process (synthesis) where opportunity for exposure arises, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (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

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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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

7.2.4 ES 7 - CS 4: Control of worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

7.2.5 ES 7 - CS 5: Control of worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at

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dedicated facilities, Transfer of substance or preparation 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Dermal exposure
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 %

Exposure routes : Inhalation exposure

Technical conditions and measures : Local exhaust ventilation

Effectiveness (of a measure) : 80 %

Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.

Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

7.2.7 ES 7 - CS 7: Control of worker exposure: Professional use (Spraying outside industrial settings and/or applications) (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

Human factors not influenced by risk management

Dermal exposure : Whole body

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

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 working clothes.
Wear suitable coveralls to prevent exposure to the skin.

Effectiveness (of a measure) : 80 %

Personal protective measures : Wear a respirator conforming to EN140 with type A filter or better.

Effectiveness (of a measure) : 40 %

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that direction of application is only horizontal or downward.

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- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the distance from worker to task is greater than 1 m.
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the direction of airflow is clearly away from the worker.
- Note : Not applicable
- Organisational measures to prevent /limit releases, dispersion and exposure : Provide enhanced general ventilation by mechanical means.
- Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of work area
- Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of equipment
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure regular inspection, cleaning and maintenance of equipment and machines.
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment

- Additional good practice advice : Wear solely goggles.

7.2.8 ES 7 - CS 8: Control of worker exposure: Professional use (Treatment of articles by dipping and pouring, Production of preparations or articles by tableting, compression, extrusion, pelettisation) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

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Outdoor / Indoor : Indoor

Risk management measures

Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Effectiveness (of a measure) : 90 %

Note : Treatment of articles by dipping and pouring

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

Product characteristics

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

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

Amount used

Storage : < 1 kg, < 1 l

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

7.2.10 ES 7 - CS 10: Control of worker exposure: Professional use (Hand-mixing with intimate contact and only PPE available) (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

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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 : Both hands and main part of the arms
Exposed skin surface assumed : 1980 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

7.3. ES 7 Exposure estimation and reference to its source

7.3.2 ES 7 - CS 2: Worker exposure: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation)) (PROC1, PROC2, PROC3)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure	0,38
Worker - inhalative, long-term - local and systemic	7,76 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term -	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified	0,003

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systemic	version, Use in closed batch process (synthesis or formulation))	
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23

7.3.3 ES 7 - CS 3: Worker exposure: Professional use (Use in batch and other process (synthesis) where opportunity for exposure arises, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (PROC4, PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,80
Worker - inhalative, long-term - local and systemic	25,88 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))	0,74
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	0,75

7.3.4 ES 7 - CS 4: Worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,50

7.3.5 ES 7 - CS 5: Worker exposure: Professional use (Transfer of substance or

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preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation 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 ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,80
Worker - inhalative, long-term - local and systemic	25,88 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	0,80

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

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,40

7.3.7 ES 7 - CS 7: Worker exposure: Professional use (Spraying outside industrial settings and/or applications) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m ³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
Human health (combined for all exposure routes)	Not applicable	0,91

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all exposure routes)

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

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Treatment of articles by dipping and pouring)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Treatment of articles by dipping and pouring)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Treatment of articles by dipping and pouring	0,75
Worker - inhalative, long-term - local and systemic	25,88 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Production of preparations or articles by tableting, compression, extrusion, pelettisation)	0,74
Worker - dermal, long-term - systemic	3,43 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Production of preparations or articles by tableting, compression, extrusion, pelettisation)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Production of preparations or articles by tableting, compression, extrusion, pelettisation	0,77

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

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,37

7.3.10 ES 7 - CS 10: Worker exposure: Professional use (Hand-mixing with intimate contact and only PPE available) (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	6,47 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,18
Worker - dermal, long-term - systemic	14,14 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,31

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

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

8.1. Titles of Contributing scenarios (CS)

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, finishing and impregnating products: including bleaches and other processing aids (PC34)		
Environment		
CS1:	Consumer use (Wide dispersive indoor use of processing aids in open systems, Wide dispersive indoor use resulting in inclusion into or onto a matrix, Wide dispersive outdoor use of processing aids in open systems, Wide dispersive outdoor use resulting in inclusion into or onto a matrix)	ERC8a, ERC8c, ERC8d, ERC8f
Consumer		
CS2:	Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products)	PC9a, PC15
CS3:	Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products)	PC9a, PC15
CS4:	Consumer use (Ink and toners)	PC18
CS5:	Consumer use (Ink and toners)	PC18
CS6:	Consumer use (Polishes and wax blends)	PC31

8.2. ES 8 Conditions of use affecting exposure

8.2.1 ES 8 - CS 1: Control of environmental exposure: Consumer use (Wide dispersive indoor use of processing aids in open systems, Wide dispersive indoor use resulting in inclusion into or onto a matrix, Wide dispersive outdoor use of processing aids in open systems, Wide dispersive outdoor use resulting in inclusion into or onto a matrix) (ERC8a, ERC8c, ERC8d, ERC8f)

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

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The use is assessed to be safe.

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 wall 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
Remarks : Type of activity or process, light work
Exposure duration : 132 min

Human factors not influenced by risk management

Dermal exposure : Hands and forearms
Exposed skin surface assumed : 1900 cm²
Dermal exposure : 0,00003 kg/min

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor
Room size : 20 m³
Temperature : 25 °C
Ventilation rate per hour : 0,6

Mass transfer rate : 0,331 m/min
Release area : 10 m²

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

Consumer Measures : No specific measures identified.

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

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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
Remarks : Type of activity or process, light work
Exposure duration : 15 min

Human factors not influenced by risk management

Dermal exposure : Hands and forearms
Exposed skin surface assumed : 1900 cm²
Dermal exposure : 0,0001 kg/min

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor
Room size : 34 m³
Temperature : 25 °C
Ventilation rate per hour : 1,5

Room height : 2,25 m
Weight percent : 30 %
Remarks : Non-Volatile
Density : 1,5 g/cm³
Remarks : Non-Volatile
Airborne fraction : 100 %
Remarks : Non-Volatile
Non-respirable uptake fraction : 1
Inhalation cut-off diameter : 0,015 mm

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

Consumer Measures : Ensure spraying away from persons.

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

Remarks : Refilling

Product characteristics

Concentration of the Substance in Mixture/Article : <= 5 %

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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
Remarks : Type of activity or process, light work
Exposure duration : 0,75 min

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Exposed skin surface assumed : 215 cm²

Other given operational conditions affecting consumers exposure

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

Mass transfer rate : 0,331 m/min
Release area : 20 cm²

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

Consumer Measures : No specific measures identified.

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

Remarks : Printing process

Product characteristics

Concentration of the Substance in Mixture/Article : <= 5 %

Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Amount used

: 0,016 kg/day

Frequency and duration of use

Exposure duration : 600 min
Frequency of use : 365 days per year
Remarks : Type of activity or process, light work

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor
Room size : 25 m³
Temperature : 25 °C

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Ventilation rate per hour : 0,6

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

Consumer Measures : No specific measures identified.

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

Remarks : No spraying

Product characteristics

Concentration of the Substance in Mixture/Article : <= 2,5 %

Molecular weight : 272 g/mol

Physical Form (at time of use) : Liquid

Vapour pressure : 0,123 hPa

Amount used

: 0,55 kg/day

Frequency and duration of use

Application duration : 900 min

Frequency of use : 1 days per year

Release duration : 120 min

Exposure duration : 240 min

Human factors not influenced by risk management

Dermal exposure : Hand, or, Palm of both hands

Exposed skin surface assumed : 430 cm²

Dermal exposure : 0,00003 kg/min

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor

Room size : 58 m³

Temperature : 25 °C

Ventilation rate per hour : 0,5

Mass transfer rate : 4740 m/min

Release area : 22 m²

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

Consumer Measures : No specific measures identified.

8.3. ES 8 Exposure estimation and reference to its source

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

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,72 mg/m ³ (ConsExpo v4.1)	0,10
Consumer - dermal, long-term - systemic	2,77 mg/kg bw/day (ConsExpo v4.1)	0,05
Consumer - oral, long-term - systemic	ConsExpo v4.1, Not applicable	
Human health (combined for all exposure routes)	ConsExpo v4.1	0,15

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

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,26 mg/m ³ (ConsExpo v4.1)	0,04
Consumer - dermal, long-term - systemic	1,15 mg/kg bw/day (ConsExpo v4.1)	0,02
Consumer - oral, long-term - systemic	0,13 mg/kg bw/day (ConsExpo v4.1, Risk management measures are based on qualitative risk characterisation.)	
Human health (combined for all exposure 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
Consumer - dermal, long-term - systemic	0,008 mg/kg bw/day (ConsExpo v4.1)	0,0002

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

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	1,29 mg/m ³ (ConsExpo v4.1)	0,18

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

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Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	3,93 mg/m ³ (ConsExpo v4.1)	0,56
Consumer - dermal, long-term - systemic	2,12 mg/kg bw/day (ConsExpo v4.1)	0,04
Human health (combined for all exposure routes)	ConsExpo v4.1	0,60

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

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

9.1. Titles of Contributing scenarios (CS)

Environment		
CS1: Industrial use (Industrial use of processing aids in processes and products, not becoming part of articles)		ERC4
Workers		
CS2: Industrial use (Use in closed process, no likelihood of exposure)		PROC1
CS3: Industrial use (Use in closed, continuous process with occasional controlled exposure)		PROC2
CS4: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises)		PROC3, PROC4
CS5: Industrial use (Spraying in industrial settings and applications)		PROC7
CS6: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)		PROC8a
CS7: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 (Industrial use of processing aids in processes and products, not becoming part of articles) (ERC4)

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Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

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

9.2.2 ES 9 - CS 2: Control of worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (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
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

9.2.3 ES 9 - CS 3: Control of worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (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

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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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use in closed, continuous process with occasional controlled exposure
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

9.2.4 ES 9 - CS 4: Control of worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in batch and other process (synthesis) where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed batch process (synthesis or formulation)

Note : Use in batch and other process (synthesis) 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 solely goggles.

9.2.5 ES 9 - CS 5: Control of worker exposure: Industrial use (Spraying in industrial settings and applications) (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

Human factors not influenced by risk management

Dermal exposure : Whole body

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
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 working clothes.
Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure) : 80 %

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the distance from worker to task is greater than 1 m.

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that direction of application is only horizontal or downward.

Organisational measures to : Regular cleaning of work area

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prevent /limit releases, dispersion
and exposure

Organisational measures to
prevent /limit releases, dispersion
and exposure : Regular cleaning of equipment

Organisational measures to
prevent /limit releases, dispersion
and exposure : Ensure regular inspection, cleaning and maintenance of
equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

9.2.6 ES 9 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation exposure
Technical conditions and
measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical exhaust or ventilation measures are not possible
or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

9.2.7 ES 9 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities) (PROC8b)

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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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Dermal exposure
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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Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

9.3. ES 9 Exposure estimation and reference to its source

9.3.2 ES 9 - CS 2: Worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

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9.3.3 ES 9 - CS 3: Worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,08

9.3.4 ES 9 - CS 4: Worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,43

9.3.5 ES 9 - CS 5: Worker exposure: Industrial use (Spraying in industrial settings and applications) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m ³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
Human health (combined for all exposure routes)	Not applicable	0,80

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9.3.6 ES 9 - CS 6: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,20

9.3.7 ES 9 - CS 7: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74

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Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,75

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

ECHA guidance for downstream users
Section 2

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

10.1. Titles of Contributing scenarios (CS)

Environment		
CS1: Professional use (Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems)		ERC8a, ERC8d
Workers		
CS2: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation))		PROC1, PROC2, PROC3
CS3: Professional use (Use in batch and other process (synthesis) where opportunity for exposure arises)		PROC4
CS4: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)		PROC8a
CS5: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)		PROC8b
CS6: Professional use (Roller application or brushing)		PROC10
CS7: Professional use (Spraying outside industrial settings and/or applications)		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 (Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems) (ERC8a, ERC8d)

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

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The use is assessed to be safe.

10.2.2 ES 10 - CS 2: Control of worker exposure: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation)) (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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed process, no likelihood of exposure, Use in closed batch process (synthesis or formulation)

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in closed, continuous process with occasional controlled exposure

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Technical conditions and measures : Use in closed, continuous process with occasional controlled exposure

Technical conditions and measures : Use in closed batch process (synthesis or formulation)
With occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

10.2.3 ES 10 - CS 3: Control of worker exposure: Professional use (Use in batch and

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other process (synthesis) 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

10.2.4 ES 10 - CS 4: Control of worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

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Effectiveness (of a measure) : 80 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

10.2.5 ES 10 - CS 5: Control of worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Both hands
Exposed skin surface assumed : 960 cm²

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Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Exposure routes : Inhalation exposure
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

10.2.7 ES 10 - CS 7: Control of worker exposure: Professional use (Spraying outside industrial settings and/or applications) (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

Human factors not influenced by risk management

Dermal exposure : Whole body

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
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 working clothes.
Wear suitable coveralls to prevent exposure to the skin.

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- Effectiveness (of a measure) : 80 %
- Personal protective measures : Wear a respirator conforming to EN140 with type A filter or better.
- Effectiveness (of a measure) : 40 %
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that direction of application is only horizontal or downward.
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the distance from worker to task is greater than 1 m.
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the direction of airflow is clearly away from the worker.
- Note : Not applicable
- Organisational measures to prevent /limit releases, dispersion and exposure : Provide enhanced general ventilation by mechanical means.
- Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of work area
- Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of equipment
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure regular inspection, cleaning and maintenance of equipment and machines.
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment

- Additional good practice advice : Wear solely goggles.

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

Product characteristics

- Concentration of the Substance in Mixture/Article : <= 100 %
- Concentration of the Substance in Mixture/Article : <= 100 %
- Physical Form (at time of use) : Low volatile liquid

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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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

10.3. ES 10 Exposure estimation and reference to its source

10.3.2 ES 10 - CS 2: Worker exposure: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation)) (PROC1, PROC2, PROC3)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure	0,38
Worker - inhalative, long-term - local and systemic	7,76 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or	0,22

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	formulation))	
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23

10.3.3 ES 10 - CS 3: Worker exposure: Professional use (Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,80

10.3.4 ES 10 - CS 4: Worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,50

10.3.5 ES 10 - CS 5: Worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to	0,80

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	vessels/large containers at dedicated facilities	
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10.3.6 ES 10 - CS 6: Worker exposure: Professional use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,40

10.3.7 ES 10 - CS 7: Worker exposure: Professional use (Spraying outside industrial settings and/or applications) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m ³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
Human health (combined for all exposure 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 ³ (ECETOC TRA v2.0 worker; modified version, Treatment of articles by dipping and pouring)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Treatment of articles by dipping and pouring)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, 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

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

11.1. Titles of Contributing scenarios (CS)

Washing and cleaning products (including solvent based products) (PC35)		
Environment		
CS1:	Consumer use (Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems)	ERC8a, ERC8d
Consumer		
CS2:	Consumer use (Washing and cleaning products (including solvent based products))	PC35
CS3:	Consumer use (Washing and cleaning products (including solvent based products))	PC35
CS4:	Consumer use (Washing and cleaning products (including solvent based products))	PC35
CS5:	Consumer use (Washing and cleaning products (including solvent based products))	PC35
CS6:	Consumer use (Washing and cleaning products (including solvent based products))	PC35
CS7:	Consumer use (Washing and cleaning products (including solvent based products))	PC35

11.2. ES 11 Conditions of use affecting exposure

11.2.1 ES 11 - CS 1: Control of environmental exposure: Consumer use (Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems) (ERC8a, ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

11.2.2 ES 11 - CS 2: Control of consumer exposure: Consumer use (Washing and cleaning products (including solvent based products)) (PC35)

Remarks : No spraying
Default database: cleaning and washing/all purpose cleaner/liquid/mixing and loading

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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
Remarks : Type of activity or process, light work
Exposure duration : 0,75 min

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Exposed skin surface assumed : 215 cm²

Other given operational conditions affecting consumers exposure

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

Mass transfer rate : 4740 m/min
Release area : 20 cm²

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

Consumer Measures : No specific measures identified.

11.2.3 ES 11 - CS 3: Control of consumer exposure: Consumer use (Washing and cleaning products (including solvent based 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

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Frequency of use : 104 days per year
Remarks : Type of activity or process, light work
Exposure duration : 240 min

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Exposed skin surface assumed : 215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor
Room size : 58 m³
Temperature : 25 °C
Ventilation rate per hour : 0,5

Mass transfer rate : 4740 m/min
Release area : 10 m²

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

Consumer Measures : No specific measures identified.

11.2.4 ES 11 - CS 4: Control of consumer exposure: Consumer use (Washing and cleaning products (including solvent based products)) (PC35)

Remarks : Spray cleaners
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 : Hands and forearms
Exposed skin surface assumed : 1900 cm²
Dermal exposure : 0,000046 kg/min

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor
Room size : 15 m³
Temperature : 25 °C
Ventilation rate per hour : 2,5

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Room height	: 2,5 m
Weight percent	: 5 %
Remarks	: Non-Volatile
Density	: 1,8 g/cm ³
Remarks	: Non-Volatile
Airborne fraction	: 20 %
Remarks	: Non-Volatile
Non-respirable uptake fraction	: 1
Inhalation cut-off diameter	: 0,015 mm

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

Consumer Measures : Ensure spraying away from persons.

11.2.5 ES 11 - CS 5: Control of consumer exposure: Consumer use (Washing and cleaning products (including solvent based products)) (PC35)

Remarks : Spray cleaners
Cleaning work

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

Application duration : 10 min
Frequency of use : 365 days per year
Remarks : Type of activity or process, light work
Exposure duration : 60 min

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Exposed skin surface assumed : 215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor
Room size : 15 m³
Temperature : 25 °C
Ventilation rate per hour : 2,5

Mass transfer rate : 4740 m/min
Release area : 17100 cm²

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

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Consumer Measures : No specific measures identified.

11.2.6 ES 11 - CS 6: Control of consumer exposure: Consumer use (Washing and cleaning products (including solvent based 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
Remarks : Type of activity or process, light work
Exposure duration : 0,75 min

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Exposed skin surface assumed : 215 cm²

Other given operational conditions affecting consumers exposure

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

Mass transfer rate : 4740 m/min
Release area : 20 cm²

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

Consumer Measures : No specific measures identified.

11.2.7 ES 11 - CS 7: Control of consumer exposure: Consumer use (Washing and cleaning products (including solvent based products)) (PC35)

Remarks : Floor cleaning (liquids)
Application

Product characteristics

Concentration of the Substance in Mixture/Article : <= 2,5 %

Molecular weight : 18 g/mol

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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
Remarks : Type of activity or process, light work
Exposure duration : 240 min

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Exposed skin surface assumed : 215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor
Room size : 58 m³
Temperature : 25 °C
Ventilation rate per hour : 0,5

Mass transfer rate : 4740 m/min
Release area : 22 m²

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

Consumer Measures : No specific measures identified.

11.3. ES 11 Exposure estimation and reference to its source

11.3.2 ES 11 - CS 2: Consumer exposure: Consumer use (Washing and cleaning products (including solvent based products)) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,01 mg/m ³ (ConsExpo v4.1)	0,001
Consumer - dermal, long-term - systemic	0,03 mg/kg bw/day (ConsExpo v4.1)	0,0006
Consumer - oral, long-term - systemic	ConsExpo v4.1, Not applicable	
Human health (combined for all exposure routes)	ConsExpo v4.1	0,002

11.3.3 ES 11 - CS 3: Consumer exposure: Consumer use (Washing and cleaning products (including solvent based products)) (PC35)

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Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,61 mg/m ³ (ConsExpo v4.1)	0,09
Consumer - dermal, long-term - systemic	11,70 mg/kg bw/day (ConsExpo v4.1)	0,22
Consumer - oral, long-term - systemic	ConsExpo v4.1, Not applicable	
Human health (combined for all exposure routes)	ConsExpo v4.1	0,31

11.3.4 ES 11 - CS 4: Consumer exposure: Consumer use (Washing and cleaning products (including solvent based products)) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,000011 mg/m ³ (ConsExpo v4.1)	
Consumer - dermal, long-term - systemic	0,01 mg/kg bw/day (ConsExpo v4.1)	0,0002
Consumer - oral, long-term - systemic	0,0006 mg/kg bw/day (ConsExpo v4.1)	
Human health (combined for all exposure routes)	ConsExpo v4.1	0,0002

11.3.5 ES 11 - CS 5: Consumer exposure: Consumer use (Washing and cleaning products (including solvent based products)) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,11 mg/m ³ (ConsExpo v4.1)	0,02
Consumer - dermal, long-term - systemic	0,12 mg/kg bw/day (ConsExpo v4.1)	0,002
Consumer - oral, long-term - systemic	ConsExpo v4.1, Not applicable	
Human health (combined for all exposure routes)	ConsExpo v4.1	0,02

11.3.6 ES 11 - CS 6: Consumer exposure: Consumer use (Washing and cleaning products (including solvent based products)) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,01 mg/m ³ (ConsExpo v4.1)	0,001

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Consumer - dermal, long-term - systemic	0,04 mg/kg bw/day (ConsExpo v4.1)	0,0008
Consumer - oral, long-term - systemic	ConsExpo v4.1, Not applicable	
Human health (combined for all exposure routes)	ConsExpo v4.1	0,002

11.3.7 ES 11 - CS 7: Consumer exposure: Consumer use (Washing and cleaning products (including solvent based products)) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,38 mg/m ³ (ConsExpo v4.1)	0,05
Consumer - dermal, long-term - systemic	7,31 mg/kg bw/day (ConsExpo v4.1)	0,14
Consumer - oral, long-term - systemic	ConsExpo v4.1, Not applicable	
Human health (combined for all exposure routes)	ConsExpo v4.1	0,19

11.4. ES 11 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

12. ES 12: Industrial use; Use in lubricants

12.1. Titles of Contributing scenarios (CS)

Environment		
CS1: Industrial use (Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use of substances in closed systems)		ERC4, ERC7
Workers		
CS2: Industrial use (Use in closed process, no likelihood of exposure)		PROC1
CS3: Industrial use (Use in closed, continuous process with occasional controlled exposure)		PROC2
CS4: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises)		PROC3, PROC4
CS5: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))		PROC5
CS6: Industrial use (Spraying in industrial settings and applications)		PROC7

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CS7: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS8: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	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 and in partly open process, Greasing at high energy conditions)	PROC17, PROC18

12.2. ES 12 Conditions of use affecting exposure

12.2.1 ES 12 - CS 1: Control of environmental exposure: Industrial use (Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use of substances in closed systems) (ERC4, ERC7)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

12.2.2 ES 12 - CS 2: Control of worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (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
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

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Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

12.2.3 ES 12 - CS 3: Control of worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use in closed, continuous process with occasional controlled exposure
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

12.2.4 ES 12 - CS 4: Control of worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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

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Exposed skin surface assumed : 240 cm²
Remarks : Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in batch and other process (synthesis) where opportunity
for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed batch process (synthesis or formulation)

Note : Use in batch and other process (synthesis) where opportunity
for exposure arises
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

12.2.5 ES 12 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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12.2.6 ES 12 - CS 6: Control of worker exposure: Industrial use (Spraying in industrial settings and applications) (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

Human factors not influenced by risk management

Dermal exposure : Whole body

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
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 working clothes.
Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure) : 80 %

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the distance from worker to task is greater than 1 m.

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that direction of application is only horizontal or downward.

Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of work area

Organisational measures to prevent /limit releases, dispersion : Regular cleaning of equipment

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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 solely goggles.

12.2.7 ES 12 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation exposure
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

12.2.8 ES 12 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

12.2.9 ES 12 - CS 9: Control of worker exposure: Industrial use (Roller application or brushing) (PROC10)

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

12.2.10 ES 12 - CS 10: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

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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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

12.2.11 ES 12 - CS 11: Control of worker exposure: Industrial use (Lubrication at high energy conditions and in partly open process, Greasing at high 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation exposure

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Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Exposure routes	:	Dermal exposure
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Note	:	Lubrication at high energy conditions and in partly open process

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

12.3. ES 12 Exposure estimation and reference to its source

12.3.2 ES 12 - CS 2: Worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

12.3.3 ES 12 - CS 3: Worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,08

12.3.4 ES 12 - CS 4: Worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,43

12.3.5 ES 12 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,38

12.3.6 ES 12 - CS 6: Worker exposure: Industrial use (Spraying in industrial settings and applications) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m ³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
Human health (combined for all exposure routes)	Not applicable	0,80

12.3.7 ES 12 - CS 7: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,20

12.3.8 ES 12 - CS 8: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,77

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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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,75

12.3.11 ES 12 - CS 11: Worker exposure: Industrial use (Lubrication at high energy conditions and in partly open process, Greasing at high 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 ³ (ECETOC TRA v2.0 worker; modified version, Lubrication at high energy conditions and in partly open process)	0,07
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Lubrication at high energy conditions and in partly open process)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Lubrication at high energy conditions and in partly open process	0,10
Worker - inhalative, long-term - local and systemic	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Greasing at high energy conditions)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Greasing at high energy conditions)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Greasing at high energy conditions	0,20

12.4. ES 12 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

13. ES 13: Industrial use; Metal working fluids

13.1. Titles of Contributing scenarios (CS)

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Environment	
CS1: Industrial use (Industrial use of processing aids in processes and products, not becoming part of articles)	ERC4
Workers	
CS2: Industrial use (Use in closed process, no likelihood of exposure)	PROC1
CS3: Industrial use (Use in closed, continuous process with occasional controlled exposure)	PROC2
CS4: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises)	PROC3, PROC4
CS5: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))	PROC5
CS6: Industrial use (Spraying in industrial settings and applications)	PROC7
CS7: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS8: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	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 and in partly open process)	PROC17

13.2. ES 13 Conditions of use affecting exposure

13.2.1 ES 13 - CS 1: Control of environmental exposure: Industrial use (Industrial use of processing aids in processes and products, not becoming part of articles) (ERC4)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

13.2.2 ES 13 - CS 2: Control of worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

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 : Palm of one hand
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

13.2.3 ES 13 - CS 3: Control of worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use in closed, continuous process with occasional controlled exposure
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

13.2.4 ES 13 - CS 4: Control of worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises) (PROC3, PROC4)

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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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in batch and other process (synthesis) where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed batch process (synthesis or formulation)

Note : Use in batch and other process (synthesis) where opportunity for exposure arises
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

13.2.5 ES 13 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

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Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

13.2.6 ES 13 - CS 6: Control of worker exposure: Industrial use (Spraying in industrial settings and applications) (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

Human factors not influenced by risk management

Dermal exposure : Whole body

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
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 working clothes.
Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure) : 80 %

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- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the distance from worker to task is greater than 1 m.
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that direction of application is only horizontal or downward.
- Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of work area
- Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of equipment
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

13.2.7 ES 13 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation exposure
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 90 %

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Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

13.2.8 ES 13 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

13.2.9 ES 13 - CS 9: Control of worker exposure: Industrial use (Roller application or brushing) (PROC10)

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

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Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

13.2.10 ES 13 - CS 10: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

13.2.11 ES 13 - CS 11: Control of worker exposure: Industrial use (Lubrication at high energy conditions and in partly open process) (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

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

Human factors not influenced by risk management

Dermal exposure : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation exposure
Technical conditions and measures : Local exhaust ventilation

Effectiveness (of a measure) : 90 %

Exposure routes : Dermal exposure
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

13.3. ES 13 Exposure estimation and reference to its source

13.3.2 ES 13 - CS 2: Worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

13.3.3 ES 13 - CS 3: Worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,07

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Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,08

13.3.4 ES 13 - CS 4: Worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,43

13.3.5 ES 13 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,38

13.3.6 ES 13 - CS 6: Worker exposure: Industrial use (Spraying in industrial settings and applications) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term	9,79 mg/m ³ (Stoffenmanager v4.0)	0,28

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- local and systemic		
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
Human health (combined for all exposure routes)	Not applicable	0,80

13.3.7 ES 13 - CS 7: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,20

13.3.8 ES 13 - CS 8: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation 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)

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(PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,75

13.3.11 ES 13 - CS 11: Worker exposure: Industrial use (Lubrication at high energy conditions and in partly open process) (PROC17)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Lubrication at high energy conditions and in partly open process)	0,07
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Lubrication at high energy conditions and in partly open process)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Lubrication at high energy conditions and in partly open process	0,10

13.4. ES 13 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

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14. ES 14: Professional use; Metal working fluids

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14.1. Titles of Contributing scenarios (CS)

Environment		
CS1:	Professional use (Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems)	ERC8a, ERC8d
Workers		
CS2:	Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation))	PROC1, PROC2, PROC3
CS3:	Professional use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))	PROC5
CS4:	Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS5:	Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS6:	Professional use (Roller application or brushing)	PROC10
CS7:	Professional use (Spraying outside industrial settings and/or applications)	PROC11
CS8:	Professional use (Treatment of articles by dipping and pouring)	PROC13
CS9:	Professional use (Lubrication at high energy conditions and in partly open process)	PROC17

14.2. ES 14 Conditions of use affecting exposure

14.2.1 ES 14 - CS 1: Control of environmental exposure: Professional use (Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems) (ERC8a, ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

14.2.2 ES 14 - CS 2: Control of worker exposure: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation)) (PROC1, PROC2, PROC3)

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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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed process, no likelihood of exposure, Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in closed, continuous process with occasional controlled exposure

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.
Technical conditions and measures : Use in closed, continuous process with occasional controlled exposure
Technical conditions and measures : Use in closed batch process (synthesis or formulation)
With occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

14.2.3 ES 14 - CS 3: Control of worker exposure: Professional use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (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

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Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

14.2.4 ES 14 - CS 4: Control of worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

14.2.5 ES 14 - CS 5: Control of worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

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

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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

14.2.6 ES 14 - CS 6: Control of worker exposure: Professional use (Roller application or brushing) (PROC10)

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Exposure routes : Inhalation exposure
Technical conditions and : Local exhaust ventilation

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measures

Effectiveness (of a measure) : 80 %

Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.

Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

14.2.7 ES 14 - CS 7: Control of worker exposure: Professional use (Spraying outside industrial settings and/or applications) (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

Human factors not influenced by risk management

Dermal exposure : Whole body

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
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 working clothes.
Wear suitable coveralls to prevent exposure to the skin.

Effectiveness (of a measure) : 80 %

Personal protective measures : Wear a respirator conforming to EN140 with type A filter or better.

Effectiveness (of a measure) : 40 %

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that direction of application is only horizontal or downward.

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the distance from worker to task is greater than 1 m.

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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 solely goggles.

14.2.8 ES 14 - CS 8: Control of worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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 solely goggles.

14.2.9 ES 14 - CS 9: Control of worker exposure: Professional use (Lubrication at high energy conditions and in partly open process) (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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation exposure
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

14.3. ES 14 Exposure estimation and reference to its source

14.3.2 ES 14 - CS 2: Worker exposure: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation)) (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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure	0,38
Worker - inhalative, long-term - local and systemic	7,76 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23

14.3.3 ES 14 - CS 3: Worker exposure: Professional use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))	0,74
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	0,75

14.3.4 ES 14 - CS 4: Worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,50

14.3.5 ES 14 - CS 5: Worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,80
Worker - inhalative, long-term - local and systemic	25,88 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,40

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14.3.7 ES 14 - CS 7: Worker exposure: Professional use (Spraying outside industrial settings and/or applications) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m ³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
Human health (combined for all exposure 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,75

14.3.9 ES 14 - CS 9: Worker exposure: Professional use (Lubrication at high energy conditions and in partly open process) (PROC17)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,40

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

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15. ES 15: Professional use; Use in agrochemicals

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15.1. Titles of Contributing scenarios (CS)

Environment	
CS1: Professional use (Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems)	ERC8a, ERC8d
Workers	
CS2: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure)	PROC1, PROC2
CS3: Professional use (Use in batch and other process (synthesis) where opportunity for exposure arises)	PROC4
CS4: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS5: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS6: Professional use (Spraying outside industrial settings and/or applications)	PROC11
CS7: Professional use (Treatment of articles by dipping and pouring)	PROC13

15.2. ES 15 Conditions of use affecting exposure

15.2.1 ES 15 - CS 1: Control of environmental exposure: Professional use (Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems) (ERC8a, ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
 The use is assessed to be safe.

15.2.2 ES 15 - CS 2: Control of worker exposure: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure) (PROC1, PROC2)

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 : Palm of one hand
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed process, no likelihood of exposure, Use in closed batch process (synthesis or formulation)

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in closed, continuous process with occasional controlled exposure

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Technical conditions and measures : Use in closed, continuous process with occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

15.2.3 ES 15 - CS 3: Control of worker exposure: Professional use (Use in batch and other process (synthesis) 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

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 solely goggles.

15.2.4 ES 15 - CS 4: Control of worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

15.2.5 ES 15 - CS 5: Control of worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

15.2.6 ES 15 - CS 6: Control of worker exposure: Professional use (Spraying outside industrial settings and/or applications) (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

Human factors not influenced by risk management

Dermal exposure : Whole body

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
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 working clothes.
Wear suitable coveralls to prevent exposure to the skin.

Effectiveness (of a measure) : 80 %

Personal protective measures : Wear a respirator conforming to EN140 with type A filter or better.

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 the distance from worker to task is greater than 1 m.
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the direction of airflow is clearly away from the worker.
- Note : Not applicable
- Organisational measures to prevent /limit releases, dispersion and exposure : Provide enhanced general ventilation by mechanical means.
- Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of work area
- Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of equipment
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure regular inspection, cleaning and maintenance of equipment and machines.
- Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment

- Additional good practice advice : Wear solely goggles.

15.2.7 ES 15 - CS 7: Control of worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

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

Frequency and duration of use

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

Human factors not influenced by risk management

- Dermal exposure : Palm of both hands
- Exposed skin surface assumed : 480 cm²

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Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

15.3. ES 15 Exposure estimation and reference to its source

15.3.2 ES 15 - CS 2: Worker exposure: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure) (PROC1, PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure	0,38

15.3.3 ES 15 - CS 3: Worker exposure: Professional use (Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,06

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Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,80
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15.3.4 ES 15 - CS 4: Worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,50

15.3.5 ES 15 - CS 5: Worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,80
Worker - inhalative, long-term - local and systemic	25,88 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	0,80

15.3.6 ES 15 - CS 6: Worker exposure: Professional use (Spraying outside industrial settings and/or applications) (PROC11)

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Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m ³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
Human health (combined for all exposure 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,75

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

ECHA guidance for downstream users
Section 2

16. ES 16: Industrial use; Use in functional fluids

16.1. Titles of Contributing scenarios (CS)

Environment	
CS1: Industrial use (Industrial use of substances in closed systems)	ERC7
Workers	
CS2: Industrial use (Use in closed process, no likelihood of exposure)	PROC1
CS3: Industrial use (Use in closed, continuous process with occasional controlled exposure)	PROC2
CS4: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises)	PROC3, PROC4
CS5: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS6: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated	PROC8b, PROC9

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facilities, Transfer of substance or preparation into small containers
(dedicated filling line, including weighing))

16.2. ES 16 Conditions of use affecting exposure

16.2.1 ES 16 - CS 1: Control of environmental exposure: Industrial use (Industrial use of substances in closed systems) (ERC7)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

16.2.2 ES 16 - CS 2: Control of worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (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
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

16.2.3 ES 16 - CS 3: Control of worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use in closed, continuous process with occasional controlled exposure
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

16.2.4 ES 16 - CS 4: Control of worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in batch and other process (synthesis) where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

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Risk management measures

Technical conditions and measures : Use in closed batch process (synthesis or formulation)

Note : Use in batch and other process (synthesis) where opportunity for exposure arises
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

16.2.5 ES 16 - CS 5: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation exposure
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

16.2.6 ES 16 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

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
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 : Palm of both hands
Exposed skin surface assumed : 480 cm²
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

16.3. ES 16 Exposure estimation and reference to its source

16.3.2 ES 16 - CS 2: Worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

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16.3.3 ES 16 - CS 3: Worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,08

16.3.4 ES 16 - CS 4: Worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,43

16.3.5 ES 16 - CS 5: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,20

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16.3.6 ES 16 - CS 6: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,37
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,43
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,37
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	0,43
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	0,43

16.4. ES 16 Guidance to Downstream User to evaluate whether he

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works inside the boundaries set by the Exposure Scenario

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

17.1. Titles of Contributing scenarios (CS)

Environment		
CS1:	Professional use (Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems)	ERC9a, ERC9b
Workers		
CS2:	Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation))	PROC1, PROC2, PROC3
CS3:	Professional use (Use in batch and other process (synthesis) where opportunity for exposure arises)	PROC4
CS4:	Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS5:	Professional use (Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	PROC9
CS6:	Professional use (Heat and pressure transfer fluids in dispersive use but closed systems)	PROC20

17.2. ES 17 Conditions of use affecting exposure

17.2.1 ES 17 - CS 1: Control of environmental exposure: Professional use (Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems) (ERC9a, ERC9b)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

17.2.2 ES 17 - CS 2: Control of worker exposure: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with

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occasional controlled exposure, Use in closed batch process (synthesis or formulation)) (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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed process, no likelihood of exposure, Use in closed batch process (synthesis or formulation)

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in closed, continuous process with occasional controlled exposure

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Technical conditions and measures : Use in closed, continuous process with occasional controlled exposure

Technical conditions and measures : Use in closed batch process (synthesis or formulation)
With occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

17.2.3 ES 17 - CS 3: Control of worker exposure: Professional use (Use in batch and other process (synthesis) 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

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Human factors not influenced by risk management

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

17.2.4 ES 17 - CS 4: Control of worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

17.2.5 ES 17 - CS 5: Control of worker exposure: Professional use (Transfer of substance or preparation into small containers (dedicated filling line, including weighing)) (PROC9)

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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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

17.2.6 ES 17 - CS 6: Control of worker exposure: Professional use (Heat and pressure transfer fluids in dispersive use but closed systems) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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17.3. ES 17 Exposure estimation and reference to its source

17.3.2 ES 17 - CS 2: Worker exposure: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation)) (PROC1, PROC2, PROC3)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure	0,38
Worker - inhalative, long-term - local and systemic	7,76 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23

17.3.3 ES 17 - CS 3: Worker exposure: Professional use (Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,80

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17.3.4 ES 17 - CS 4: Worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,50

17.3.5 ES 17 - CS 5: Worker exposure: Professional use (Transfer of substance or preparation 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 ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	0,80

17.3.6 ES 17 - CS 6: Worker exposure: Professional use (Heat and pressure transfer fluids in dispersive use but closed systems) (PROC20)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	1,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,02
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,39

17.4. ES 17 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

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18. ES 18: Consumer use; Heat transfer fluids, Hydraulic fluids

18.1. Titles of Contributing scenarios (CS)

Heat transfer fluids (PC16)	
Hydraulic fluids (PC17)	
Environment	
CS1: Consumer use (Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems)	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 (Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems) (ERC9a, ERC9b)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

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 preparation (charging/discharging) from/to vessels/large containers 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
Remarks : Type of activity or process, light work

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Human factors not influenced by risk management

Dermal exposure : Both hands
Exposed skin surface assumed : 960 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor
Temperature : 25 °C

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

Consumer Measures : No specific measures identified.

18.3. ES 18 Exposure estimation and reference to its source

18.3.2 ES 18 - CS 2: Consumer exposure: Consumer use (Heat transfer fluids, Hydraulic fluids) (PC16, PC17)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	1,93 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	0,28
Worker - dermal, long-term - systemic	4,11 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	0,08
Oral exposure	Not applicable	
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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

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

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19.1. Titles of Contributing scenarios (CS)

Environment		
CS1:	Professional use (Wide dispersive outdoor use of processing aids in open systems)	ERC8d
Workers		
CS2:	Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure)	PROC1, PROC2
CS3:	Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS4:	Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	PROC8b
CS5:	Professional use (Spraying outside industrial settings and/or applications)	PROC11

19.2. ES 19 Conditions of use affecting exposure

19.2.1 ES 19 - CS 1: Control of environmental exposure: Professional use (Wide dispersive outdoor use of processing aids in open systems) (ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

19.2.2 ES 19 - CS 2: Control of worker exposure: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure) (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

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Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed process, no likelihood of exposure, Use in closed batch process (synthesis or formulation)

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in closed, continuous process with occasional controlled exposure

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Technical conditions and measures : Use in closed, continuous process with occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

19.2.3 ES 19 - CS 3: Control of worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.

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Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

19.2.4 ES 19 - CS 4: Control of worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

19.2.5 ES 19 - CS 5: Control of worker exposure: Professional use (Spraying outside industrial settings and/or applications) (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

Human factors not influenced by risk management

Dermal exposure : Whole body

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Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
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 working clothes.

Effectiveness (of a measure) : 80 %
Wear suitable coveralls to prevent exposure to the skin.

Personal protective measures : Wear a respirator conforming to EN140 with type A filter or better.

Effectiveness (of a measure) : 40 %

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that direction of application is only horizontal or downward.

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the distance from worker to task is greater than 1 m.

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the direction of airflow is clearly away from the worker.

Note : Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure : Provide enhanced general ventilation by mechanical means.

Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of work area

Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of equipment

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure regular inspection, cleaning and maintenance of equipment and machines.

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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19.3. ES 19 Exposure estimation and reference to its source

19.3.2 ES 19 - CS 2: Worker exposure: Professional use (Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure) (PROC1, PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed process, no likelihood of exposure	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed, continuous process with occasional controlled exposure	0,38

19.3.3 ES 19 - CS 3: Worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,50

19.3.4 ES 19 - CS 4: Worker exposure: Professional use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities) (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term	25,88 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,74

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- local and systemic	version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,80

19.3.5 ES 19 - CS 5: Worker exposure: Professional use (Spraying outside industrial settings and/or applications) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m ³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
Human health (combined for all exposure 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. Titles of Contributing scenarios (CS)

Anti-freeze and de-icing products (PC4)	
Environment	
CS1: Consumer use (Wide dispersive outdoor use of processing aids in open systems)	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

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20.2.1 ES 20 - CS 1: Control of environmental exposure: Consumer use (Wide dispersive outdoor use of processing aids in open systems) (ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

20.2.2 ES 20 - CS 2: Control of consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Remarks : De-icing of vehicles and similar equipment by spraying
Spraying

Product characteristics

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

Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Amount used

Amounts used : 0,0468 kg/min

Frequency and duration of use

Spray duration : 0,7 min
Frequency of use : 365 days per year
Exposure duration : 240 min

Human factors not influenced by risk management

Dermal exposure : Hands and forearms
Exposed skin surface assumed : 1900 cm²
Dermal exposure : 0,000046 kg/min

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor
Room size : 58 m³
Temperature : 25 °C
Ventilation rate per hour : 0,5

Room height : 2,5 m
Weight percent : 100 %
Remarks : Non-Volatile
Density : 1,8 g/cm³

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Remarks : Non-Volatile
Airborne fraction : 100 %
Remarks : Non-Volatile
Non-respirable uptake fraction : 1
Inhalation cut-off diameter : 0,015 mm

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

Consumer Measures : Ensure spraying away from persons.

20.2.3 ES 20 - CS 3: Control of consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Remarks : De-icing of vehicles and similar equipment by spraying
Cleaning work

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
Remarks : Type of activity or process, light work

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Exposed skin surface assumed : 215 cm²

Other given operational conditions affecting consumers exposure

Temperature : 25 °C

20.2.4 ES 20 - CS 4: Control of consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 30 %

Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : < 15 min
Remarks : Type of activity or process, light work

Human factors not influenced by risk management

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Dermal exposure : Both hands
Exposed skin surface assumed : 960 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor
Temperature : 25 °C

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

Consumer Measures : No specific measures identified.

20.3. ES 20 Exposure estimation and reference to its source

20.3.2 ES 20 - CS 2: Consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,0006 mg/m ³ (ConsExpo v4.1)	0,0001
Consumer - dermal, long-term - systemic	0,50 mg/kg bw/day (ConsExpo v4.1)	0,009
Consumer - oral, long-term - systemic	0,005 mg/kg bw/day (ConsExpo v4.1)	
Human health (combined for all exposure routes)	ConsExpo v4.1	0,009

20.3.3 ES 20 - CS 3: Consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	Not applicable	
Consumer - dermal, long-term - systemic	4,46 mg/kg bw/day (ConsExpo v4.1)	0,08
Consumer - oral, long-term - systemic	Not applicable	
Human health (combined for all exposure routes)	ConsExpo v4.1	0,08

20.3.4 ES 20 - CS 4: Consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

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Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	1,93 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	0,28
Worker - dermal, long-term - systemic	4,11 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	0,08
Oral exposure	Not applicable	
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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; Laboratory use

21.1. Titles of Contributing scenarios (CS)

Environment		
CS1: Industrial use, Professional use (Wide dispersive indoor use of processing aids in open systems)		ERC8a
Workers		
CS2: Industrial use, Professional use (Use as laboratory reagent)		PROC15

21.2. ES 21 Conditions of use affecting exposure

21.2.1 ES 21 - CS 1: Control of environmental exposure: Industrial use, Professional use (Wide dispersive indoor use of processing aids in open systems) (ERC8a)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

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**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
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

21.3. ES 21 Exposure estimation and reference to its source

21.3.2 ES 21 - CS 2: Worker exposure: Industrial use, Professional use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

21.4. ES 21 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

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Section 2

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

22.1. Titles of Contributing scenarios (CS)

Environment		
CS1:	Industrial use (Formulation in materials, Industrial use of processing aids in processes and products, not becoming part of articles)	ERC3, ERC4
Workers		
CS2:	Industrial use (Use in closed process, no likelihood of exposure)	PROC1
CS3:	Industrial use (Use in closed, continuous process with occasional controlled exposure)	PROC2
CS4:	Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS6:	Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 in materials, Industrial use of processing aids in processes and products, not becoming part of articles) (ERC3, ERC4)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

22.2.2 ES 22 - CS 2: Control of worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (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
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

22.2.3 ES 22 - CS 3: Control of worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use in closed, continuous process with occasional controlled exposure
No specific measures identified.

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Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

22.2.4 ES 22 - CS 4: Control of worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in batch and other process (synthesis) where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed batch process (synthesis or formulation)

Note : Use in batch and other process (synthesis) where opportunity for exposure arises
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

22.2.5 ES 22 - CS 5: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation exposure
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

22.2.6 ES 22 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

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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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

22.3. ES 22 Exposure estimation and reference to its source

22.3.2 ES 22 - CS 2: Worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

22.3.3 ES 22 - CS 3: Worker exposure: Industrial use (Use in closed, continuous

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process with occasional controlled exposure) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,08

22.3.4 ES 22 - CS 4: Worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,43

22.3.5 ES 22 - CS 5: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,20

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22.3.6 ES 22 - CS 6: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,75

22.4. ES 22 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

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23. ES 23: Consumer use; Adhesives, sealants

23.1. Titles of Contributing scenarios (CS)

Adhesives, sealants (PC1)	
Environment	
CS1: Consumer use (Wide dispersive indoor use resulting in inclusion into or onto a matrix, Wide dispersive outdoor use resulting in inclusion into or onto a matrix)	ERC8c, ERC8f
Consumer	
CS2: Consumer use (Adhesives, sealants)	PC1

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23.2. ES 23 Conditions of use affecting exposure

23.2.1 ES 23 - CS 1: Control of environmental exposure: Consumer use (Wide dispersive indoor use resulting in inclusion into or onto a matrix, Wide dispersive outdoor use resulting in inclusion into or onto a matrix) (ERC8c, ERC8f)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

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

Exposed skin surface assumed : 110 cm²
Dermal exposure : 0,00003 kg/min

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor
Room size : 58 m³
Temperature : 25 °C
Ventilation rate per hour : 0,5

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Mass transfer rate : 4740 m/min
Release area : 4 m²

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

Consumer Measures : No specific measures identified.

23.3. ES 23 Exposure estimation and reference to its source

23.3.2 ES 23 - CS 2: Consumer exposure: Consumer use (Adhesives, sealants) (PC1)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	4,1 mg/m ³ (ConsExpo v4.1)	0,59
Consumer - dermal, long-term - systemic	0,26 mg/kg bw/day (ConsExpo v4.1)	0,005
Consumer - oral, long-term - systemic	Not applicable	
Human health (combined for all exposure 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, Coatings, Use in polymer production

24.1. Titles of Contributing scenarios (CS)

Environment		
CS1: Industrial use (Formulation of preparations, Formulation in materials, Industrial use resulting in inclusion into or onto a matrix, Industrial use of monomers for manufacture of thermoplastics)	ERC2, ERC3, ERC5, ERC6c	
Workers		
CS2: Industrial use (Use in closed process, no likelihood of exposure)	PROC1	
CS3: Industrial use (Use in closed, continuous process with occasional controlled exposure)	PROC2	

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CS4: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises)	PROC3, PROC4
CS5: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact))	PROC5
CS6: Industrial use (Spraying in industrial settings and applications)	PROC7
CS7: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities)	PROC8a
CS8: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS9: Industrial use (Roller application or brushing)	PROC10
CS10: Industrial use (Treatment of articles by dipping and pouring)	PROC13
CS11: Industrial use (Production of preparations or articles by tableting, compression, extrusion, pelettisation)	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 of preparations, Formulation in materials, Industrial use resulting in inclusion into or onto a matrix, Industrial use of monomers for manufacture of thermoplastics) (ERC2, ERC3, ERC5, ERC6c)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
The use is assessed to be safe.

24.2.2 ES 24 - CS 2: Control of worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (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

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Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed process, no likelihood of exposure
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

24.2.3 ES 24 - CS 3: Control of worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (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 both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use in closed, continuous process with occasional controlled exposure
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

24.2.4 ES 24 - CS 4: Control of worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises) (PROC3, PROC4)

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
Exposed skin surface assumed : 240 cm²
Remarks : Use in closed batch process (synthesis or formulation)
Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²
Remarks : Use in batch and other process (synthesis) where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Technical conditions and measures : Use in closed batch process (synthesis or formulation)

Note : Use in batch and other process (synthesis) where opportunity for exposure arises
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

24.2.5 ES 24 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

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Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

- Additional good practice advice : Wear solely goggles.

24.2.6 ES 24 - CS 6: Control of worker exposure: Industrial use (Spraying in industrial settings and applications) (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

Human factors not influenced by risk management

- Dermal exposure : Whole body

Other operational conditions affecting workers exposure

- Outdoor / Indoor : Indoor
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 working clothes.
Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure) : 80 %
Organisational measures to prevent /limit releases, dispersion and exposure : Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to : Ensure that direction of application is only horizontal or

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prevent /limit releases, dispersion and exposure : downward.

Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of work area

Organisational measures to prevent /limit releases, dispersion and exposure : Regular cleaning of equipment

Organisational measures to prevent /limit releases, dispersion and exposure : Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

24.2.7 ES 24 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Inhalation exposure
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

24.2.8 ES 24 - CS 8: Control of worker exposure: Industrial use (Transfer of

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substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

24.2.9 ES 24 - CS 9: Control of worker exposure: Industrial use (Roller application or brushing) (PROC10)

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Both hands
Exposed skin surface assumed : 960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Exposure routes : Dermal exposure
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in

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Effectiveness (of a measure) : combination with 'basic' employee training.
: 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

24.2.10 ES 24 - CS 10: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

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

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

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

24.2.11 ES 24 - CS 11: Control of worker exposure: Industrial use (Production of preparations or articles by tableting, compression, extrusion, pelettisation) (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 : Palm of both hands
Exposed skin surface assumed : 480 cm²

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Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

24.2.12 ES 24 - CS 12: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics

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

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

Amount used

Storage : < 1 kg, < 1 l

Frequency and duration of use

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

Human factors not influenced by risk management

Dermal exposure : Palm of both hands
Exposed skin surface assumed : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Risk management measures

Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

24.3. ES 24 Exposure estimation and reference to its source

24.3.2 ES 24 - CS 2: Worker exposure: Industrial use (Use in closed process, no likelihood of exposure) (PROC1)

Route of exposure and type	Exposure estimate	RCR
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of effects		
Worker - inhalative, long-term - local and systemic	0,03 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,004

24.3.3 ES 24 - CS 3: Worker exposure: Industrial use (Use in closed, continuous process with occasional controlled exposure) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,08

24.3.4 ES 24 - CS 4: Worker exposure: Industrial use (Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) 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 ³ (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation))	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in closed batch process (synthesis or formulation)	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises)	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Use in batch and other process (synthesis) where opportunity for exposure arises	0,43

24.3.5 ES 24 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)) (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 ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,38

24.3.6 ES 24 - CS 6: Worker exposure: Industrial use (Spraying in industrial settings and applications) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m ³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
Human health (combined for all exposure routes)	Not applicable	0,80

24.3.7 ES 24 - CS 7: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,13
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,20

24.3.8 ES 24 - CS 8: Worker exposure: Industrial use (Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation)	0,06

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	(charging/discharging) from/to vessels/large containers at dedicated facilities)	
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation into small containers (dedicated filling line, including weighing))	0,06
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version, Transfer of substance or preparation 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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,03
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	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 ³ (ECETOC TRA v2.0 worker; modified version)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,01
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,75

24.3.11 ES 24 - CS 11: Worker exposure: Industrial use (Production of preparations or articles by tableting, compression, extrusion, pelettisation) (PROC14)

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

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Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,40
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24.3.12 ES 24 - CS 12: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m ³ (ECETOC TRA v2.0 worker; modified version)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA v2.0 worker; modified version)	0,003
Human health (combined for all exposure routes)	ECETOC TRA v2.0 worker; modified version	0,37

24.4. ES 24 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

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25. ES 25: Consumer use; Insulation foams

25.1. Titles of Contributing scenarios (CS)

Polymer preparations and compounds (PC32)		
Environment		
CS1: Consumer use (Wide dispersive indoor use resulting in inclusion into or onto a matrix, Wide dispersive outdoor use resulting in inclusion into or onto a matrix)		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 (Wide dispersive indoor use resulting in inclusion into or onto a matrix, Wide dispersive outdoor use resulting in inclusion into or onto a matrix) (ERC8c, ERC8f)

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

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The use is assessed to be safe.

25.2.2 ES 25 - CS 2: Control of consumer exposure: Consumer use (Polymer preparations and compounds) (PC32)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 5 %

Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Amount used

Amount per use : 0,825 kg

Frequency and duration of use

Exposure duration : 30 min
Frequency of use : 0,2 days per year

Human factors not influenced by risk management

Exposed skin surface assumed : 1900 cm²
Breathing volume : 1,5 m³/day

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor
Room size : 57,5 m³
Temperature : 25 °C

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

Consumer Measures : No specific measures identified.

25.3. ES 25 Exposure estimation and reference to its source

25.3.2 ES 25 - CS 2: Consumer exposure: Consumer use (Polymer preparations and compounds) (PC32)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-	0,06 mg/m ³ (ConsExpo v4.1)	0,009

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term - local and systemic		
Consumer - dermal, long-term - systemic	0,007 mg/kg bw/day (ConsExpo v4.1)	0,0008
Consumer - oral, long-term - systemic	Not applicable	
Human health (combined for all exposure routes)	ConsExpo v4.1	0,01

25.4. ES 25 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2