ES FOR COMMUNICATION

Substance Name: n-butyl acetate

EC Number: 204-658-1

CAS Number: 123-86-4

Registration Number: 01-2119485493-29-****

Note: Extended Safety Data Sheet (shorted as eSDS) composed of Safety Data Sheet and Annex to Safety Data Sheet shall be supplied to your EU importers for the above registered substance according to EU REACH regulation. Please remember to supply this Annex to your EU importers together with Safety Data Sheet.

Declaration:

This document of exposure scenarios (ES) for Safety Data Sheets is made according to Article 31 (7) of Regulation (EU) No. 1907/2006 (REACH), *Any actor in the supply chain who is required to prepare a chemical safety report according to Articles 14 or 37 shall placethe relevant exposure scenarios (including use and exposure categories where appropriate) inan annex to the safety data sheet covering identified uses and including specific conditions resulting from the application of section 3 of Annex XI*. The document is made based on the exposure scenarios (ES) in Chemical Safety Report (CSR) provided by the client or lead registrants who prepared the CSR. If downstream users receive the document and find any mistakes, please give feedbacks to REACH24H. REACH24H will contact with the client or lead registrants to check the mistakes. If the CSR is updated, this ES communication document will be updated accordingly and transfer to the downstream users.

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9. EXPOSURE ASSESSMENT (and related risk characterisation)

9.0. Introduction

9.0.1. Overview of uses and Exposure Scenarios

Tonnage information:

Assessed tonnage: 120000.0 tonnes/year based on:

%• 120000.0 tonnes/year manufactured

The following table list all the exposure scenarios (ES) assessed in this CSR.

Table 58. Overview of exposure scenarios and contributing scenarios

Identifiers	Market Sector	Titles of exposure scenarios and the related contributing scenarios	Tonnage (tonnes per year)
ES1 - M1		Manufacture - Manufacture of Butyl Acetate - Manufacture (ERC 1) - Use in closed process, no likelihood of exposure (PROC 1) - Use in closed, continuous process with occasional controlled exposure (PROC 2) - Use in closed batch process (synthesis or formulation) (PROC 3) - Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b) - Use as laboratory reagent (PROC 15)	120000.0
ES2 - F1		Formulation - Distribution - Distribution (ERC 2) - Use in closed process, no likelihood of exposure (PROC 1) - Use in closed, continuous process with occasional controlled exposure (PROC 2) - Use in closed batch process (synthesis or formulation) (PROC 3) - Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC	120000.0

Identifiers	Market Sector	Titles of exposure scenarios and the related contributing scenarios	Tonnage (tonnes per year)
		8b) - Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9) - Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9) - Use as laboratory reagent (PROC 15)	
ES3 - F2		Formulation - Formulation - Formulation (ERC 2) - Use in closed process, no likelihood of exposure (PROC 1) - Use in closed, continuous process with occasional controlled exposure (PROC 2) - Use in closed batch process (synthesis or formulation) (PROC 3) - Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4) - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5) - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b) - Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9) - Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9) - Production of preparations or articles by tabletting, compression, extrusion, pelletisation (PROC 14) - Production of preparations or articles by tabletting, compression, extrusion, pelletisation (PROC 14) - Use as laboratory reagent (PROC 15)	4000.0
ES4 - IW1		Use at industrial site - Use in coatings (ind) - Use in coatings (ERC 4) - Use in closed process, no likelihood of exposure (PROC 1) - Use in closed, continuous process with occasional controlled exposure (PROC 2) - Use in closed batch process (synthesis or formulation) (PROC 3) - Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4) - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5) - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	5000.0

Identifiers	Market Sector	Titles of exposure scenarios and the related contributing scenarios	Tonnage (tonnes per year)
		(PROC 5) - Industrial spraying (PROC 7) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b) - Roller application or brushing (PROC 10) - Roller application or brushing (PROC 10) - Treatment of articles by dipping and pouring (PROC 13) - Treatment of articles by dipping and pouring (PROC 13) - Use as laboratory reagent (PROC 15)	
ES5 - PW1		Use by professional worker - Use in coatings (prof) - Use in coatings (ERC 8a) - Use in closed process, no likelihood of exposure (PROC 1) - Use in closed, continuous process with occasional controlled exposure (PROC 2) - Use in closed batch process (synthesis or formulation) (PROC 3) - Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4) - Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4) - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5) - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b) - Roller application or brushing (PROC 10) - Roller application or brushing (PROC 10) - Non industrial spraying (PROC 11) - Non industrial spraying (PROC 11) - Non industrial spraying (PROC 11) - Treatment of articles by dipping and pouring (PROC 13) - Use as laboratory reagent (PROC 15) - Hand-mixing with intimate contact and only PPE available	4000.0

Identifiers	Market Sector	Titles of exposure scenarios and the related contributing scenarios	Tonnage (tonnes per year)
		(PROC 19) - Hand-mixing with intimate contact and only PPE available (PROC 19)	
ES6 - C1		Consumer Use - Use in coatings (consumer) - Use in coatings (ERC 8a) - Adhesives, sealants (PC 1) - Anti-freeze and de-icing products (PC 4) - Biocidal products (e.g. disinfectants, pest control) (PC 8) - Coatings and paints, thinners, paint removes (PC 9a) - Fillers, putties, plasters, modelling clay (PC 9b) - Finger paints (PC 9c) - Non-metal-surface treatment products (PC 15) - Ink and Toners (PC 18) - Leather tanning, dye, finishing, impregnation and care products (PC 23) - Lubricants, greases, release products (PC 24) - Polishes and wax blends (PC 31) - Textile dyes, finishing and impregnating products; including bleaches and other processing aids (PC 34)	2000.0
ES7 - IW2		Use at industrial site - Use in cleaning agents (ind) - Use in cleaning agents (ERC 4) - Use in closed process, no likelihood of exposure (PROC 1) - Use in closed, continuous process with occasional controlled exposure (PROC 2) - Use in closed batch process (synthesis or formulation) (PROC 3) - Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4) - Industrial spraying (PROC 7) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b) - Roller application or brushing (PROC 10) - Roller application or brushing (PROC 10) - Treatment of articles by dipping and pouring (PROC 13) - Treatment of articles by dipping and pouring (PROC 13)	100.0
ES8 - PW2		Use by professional worker - Use in cleaning agents (prof) - Use in cleaning agents (ERC 8a) - Use in closed process, no likelihood of exposure (PROC 1) - Use in closed, continuous process with occasional controlled exposure (PROC 2) - Use in closed batch process (synthesis or formulation) (PROC 3) - Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4) - Use in batch and other process (synthesis) where opportunity	2000.0

Identifiers	Market Sector	Titles of exposure scenarios and the related contributing scenarios	Tonnage (tonnes per year)
		for exposure arises (PROC 4) - Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4) - Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b) - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b) - Roller application or brushing (PROC 10) - Roller application or brushing (PROC 10) - Roller application or brushing (PROC 10) - Non industrial spraying (PROC 11) - Non industrial spraying (PROC 11) - Treatment of articles by dipping and pouring (PROC 13) - Treatment of articles by dipping and pouring (PROC 13) - Treatment of articles by dipping and pouring (PROC 13)	
ES9 - C2		Consumer Use - Use in cleaning agents (consumer) - Use in cleaning agents (ERC 8a) - Air care products (PC 3) - Anti-freeze and de-icing products (PC 4) - Biocidal products (e.g. disinfectants, pest control) (PC 8) - Coatings and paints, thinners, paint removes (PC 9a) - Fillers, putties, plasters, modelling clay (PC 9b) - Finger paints (PC 9c) - Lubricants, greases, release products (PC 24) - Washing and cleaning products (including solvent based products) (PC 35) - Welding and soldering products (with flux coatings or flux cores.), flux products (PC 38)	2000.0
ES10 - IW3		Use at industrial site - Use in laboratories (ind) - Use in laboratories (ERC 4) - Roller application or brushing (PROC 10) - Roller application or brushing (PROC 10) - Use as laboratory reagent (PROC 15)	1.0

Identifiers	Market Sector	Titles of exposure scenarios and the related contributing scenarios	Tonnage (tonnes per year)
ES11 - PW3		Use by professional worker - Use in laboratories (prof) - Use in laboratories (ERC 8a) - Roller application or brushing (PROC 10) - Roller application or brushing (PROC 10) - Use as laboratory reagent (PROC 15)	1.0
ES12 - C3		Consumer Use - Use in personal care products - Use in personal care products (ERC 8a)	2000.0
Manufacture: M-#, Formulation: F-#, Industrial end use at site: IW-#, Professional end use: PW-#, Consumer end use: C-#, Service life (by workers in industrial site): SL-IW-#, Service life (by professional workers): SL-PW-#, Service life (by consumers): SL-C-#.)			

9.0.2. Introduction to the assessment

9.0.2.1. Environment

Scope and type of assessment

The scope of exposure assessment and type of risk characterisation required for the environment are described in the following table based on the hazard conclusions presented in section 7.

Table 59. Type of risk characterisation required for the environment

Protection target	Type of risk characterisation	Hazard conclusion (see section 7)
Freshwater	Quantitative	PNEC aqua (freshwater) = 0.18 mg/L
Sediment (freshwater)	Quantitative	PNEC sediment (freshwater) = 0.981 mg/kg sediment dw
Marine water	Quantitative	PNEC aqua (marine water) = 0.018 mg/L
Sediment (marine water)	Quantitative	PNEC sediment (marine water) = 0.098 mg/kg sediment dw
Sewage treatment plant	Quantitative	PNEC STP = 35.6 mg/L
Air	Not needed	No hazard identified
Agricultural soil	Quantitative	PNEC soil = 0.09 mg/kg soil dw
Predator	Not needed	No potential for bioaccumulation

Comments on assessment approach:

The regional concentrations are reported in section 10.2.1.2 (see Table 171, “Predicted regional exposure concentrations (Regional PEC)”). The local Predicted Exposure Concentrations (PECs) reported for each contributing scenario correspond to the sum of the local concentrations (Clocal) and the regional concentrations (PEC regional).

A quantitative assessment was carried out for all environmental protection targets except for air and for predators, for which no hazard had been identified.
The release estimation is based on environmental release categories (ERCs) or specific environmental release categories (SPERCs).
For evaluation of the manufacturing exposure scenario of Butyl Acetate, the values for the parameters discharge rate of STP and receiving surface water flow rate were refined to reflect a realistic dilution rate (river). Furthermore, it is taken into account that the sludge from STP is not applied on agricultural soil for the following scenarios:
- Manufacture of Butyl Acetate

- Formulation
- Use in coatings (ind)
- Use in laboratories (ind)

The release factors for some spERCs were refined to achieve RCRs below 1. Please be aware that the choice of RMM leading to the recommended emission reduction is under the responsibility of the manufacturer/formulator/user of the substance.

9.0.2.2. Man via environment

Scope and type of assessment

The scope of exposure assessment and type of risk characterisation required for man via the environment are described in the following table based on the hazard conclusions reported and justified in section 5.11.

Table 60. Type of risk characterisation required for man via the environment

Route of exposure and type of effects	Type of risk characterisation	Hazard conclusion (see section 5.11)
Inhalation: Systemic, long-term	Quantitative	DNEL (Derived No Effect Level) = 35.7 mg/m³
Oral: Systemic, long-term	Quantitative	DNEL (Derived No Effect Level) = 2 mg/kg bw/day

9.0.2.3. Workers

Scope and type of assessment

The scope of exposure assessment and type of risk characterisation required for workers are described in the following table based on the hazard conclusions presented in section 5.11.

Table 61. Type of risk characterisation required for workers

Route	Type of effect	Type of risk characterisation	Hazard conclusion (see section 5.11)
Inhalation	Systemic, long-term	Quantitative	DNEL (Derived No Effect Level) = 300 mg/m³
	Systemic, acute	Quantitative	DNEL (Derived No Effect Level) = 600 mg/m³
	Local, long-term	Quantitative	DNEL (Derived No Effect Level) = 300 mg/m³
	Local, acute	Quantitative	DNEL (Derived No Effect Level) = 600 mg/m³
Dermal	Systemic, long-term	Quantitative	DNEL (Derived No Effect Level) = 11 mg/kg bw/day
	Systemic, acute	Quantitative	DNEL (Derived No Effect Level) = 11 mg/kg bw/day
	Local, long-term	Not needed	No hazard identified
	Local, acute	Not needed	No hazard identified
Eye	Local	Not needed	No hazard identified

Comments on assessment approach related to toxicological hazard:

A quantitative assessment was carried out for short term and long term systemic hazards via skin as well as for short term and long term local hazards via inhalation using Chesar 2.3. The exposure of workers was estimated using the ECETOC TRA 3.0 modelling tool.

Short term exposure dermal:
Exposure estimation for short term peak exposures was based on ECHA guidance R.14 (R.14.4.6.2): It is

assumed that short term peak dermal contamination will not lead to a peak internal body dose due to low absorption rate of n-Butylacetate: 1.6 +/- 0.1 g/m²*h (Ursin et al., 1995). Consequently, exposure estimation for dermal long term systemic was used as a conservative value and compared to the acute, dermal DNEL in order to demonstrate safe use.

9.0.2.4. Consumers

Scope and type of assessment

The scope of exposure assessment and type of risk characterisation required for consumers are described in the following table based on the hazard conclusions presented in section 5.11.

Table 62. Type of risk characterisation required for consumers

Route	Type of effect	Type of risk characterisation	Hazard conclusion (see section 5.11)
Inhalation	Systemic, long-term	Quantitative	DNEL (Derived No Effect Level) = 35.7 mg/m³
	Systemic, acute	Quantitative	DNEL (Derived No Effect Level) = 300 mg/m³
	Local, long-term	Quantitative	DNEL (Derived No Effect Level) = 35.7 mg/m³
	Local, acute	Quantitative	DNEL (Derived No Effect Level) = 300 mg/m³
Dermal	Systemic, long-term	Quantitative	DNEL (Derived No Effect Level) = 6 mg/kg bw/day
	Systemic, acute	Quantitative	DNEL (Derived No Effect Level) = 6 mg/kg bw/day
	Local, long-term	Not needed	No hazard identified
	Local, acute	Not needed	No hazard identified
Eye	Local	Not needed	No hazard identified
Oral	Systemic, long-term	Quantitative	DNEL (Derived No Effect Level) = 2 mg/kg bw/day

Comments on assessment approach:

The risk assessment regarding consumer uses was performed using the consumer tool available from ESIG. To assess short term inhalative exposures, the predicted event concentration is compared to the acute DNEL inhalation. Long term exposure estimates (concentration per day, 24h) are compared to long term DNELs in order to demonstrate safe use regarding chronic effects (inhalation, dermal, oral).

For oral exposures it is assumed that long term/daily exposures are already calculated conservatively. Consequently, no acute exposures were calculated for the oral route and are regarded to be covered by the risk assessment for long term/daily assessment since long term and acute DNEL oral are equal (2 mg/kg bw/d).

Short term exposure dermal:
A similar approach was followed as described for occupational exposure (ECHA guidance R.14; R.14.4.6.2): It is assumed that short-term peak dermal exposure will not lead to a peak internal body dose due to low absorption rate of Butylacetate: 1.6 +/- 0.1 g/m²*h (Ursin et al., 1995). Consequently,
exposure estimation for dermal long-term (daily) exposure was used as a conservative value and compared to the acute, dermal DNEL in order to demonstrate safe use.

9.1. Exposure scenario 1: Manufacture - Manufacture of Butyl Acetate

Environment contributing scenario(s):	
Manufacture	ERC 1
Worker contributing scenario(s):	
Use in closed process, no likelihood of exposure	PROC 1
Use in closed, continuous process with occasional controlled exposure	PROC 2
Use in closed batch process (synthesis or formulation)	PROC 3
Use in batch and other process (synthesis) where opportunity for exposure arises	PROC 4
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Use as laboratory reagent	PROC 15

Description of the technical process covered by the SpERC: ESVOC 1.1.v1

Manufacturing of petroleum substances and petrochemicals encompasses a wide range of activities such as material recycling/recovery, transfers, storage, etc. Substance losses to air are reduced through use of general and site-specific risk management measures to maintain workplace concentrations of airborne VOCs and particulates below respective OELs; and through use of closed or covered equipment/processes to minimize evaporative losses of VOCs. Substance losses to wastewater are generally restricted to equipment cleaning, as processes operate without contact with water. Such uses and properties of the substance result in limited to no discharge to wastewater or to soil from the industrial site.

9.1.1. Environmental contributing scenario 1: Manufacture

9.1.1.1. Conditions of use

spERC was modified

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 400 tonnes/day *spERC was modified: Tonnage/day was reduced from 2000 tonnes/day (typical maximum site tonnage based on sector knowledge) to 400 tonnes/day. Number of emission days: 300 emission days/year.*
• Annual use at a site: <= 1.2E5 tonnes/year
• Percentage of EU tonnage used at regional scale: = 100 %
Technical and organisational conditions and measures
• Indoor/Outdoor use: Indoor use
• Process efficiency: Process optimized for highly efficient use of raw materials (very minimal environmental release)
• Equipment cleaning: No release to wastewater from process as such, wastewater emissions limited to release generated from final equipment cleaning step using water
• On-site treatment of off-air: Typical measures to maintain workplace concentrations or airborne VOCs and particulates below respective OELS (e.g. thermal wet scrubber - gas removal and/or air filtration - particle removal and/or thermal oxidation and/or vapour recovery - adsorption)
• On-site treament of wastewater: Acclimated biological treatment [Effectiveness Water: 98%] *spERC was modified: Efficiency of on-site treatment of wastewater was increased from 70% to 98%.*

However, the choice of the RMM leading to the recommended emission reduction is under the responsibility of the manufacturer of the substance.
• On-site treatment of off-air: Vapor recovery (adsorption ...) [Effectiveness Air: 90%]
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 88.85%]
• Discharge rate of STP: >= 2.88E4 m3/d *spERC assumption was modified*
• Application of the STP sludge on agricultural soil: No
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 3.456E6 m3/d *spERC assumption was modified*

9.1.1.2. Releases

The local releases to the environment are reported in the following table.

Table 63. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based ESVOC 1.1.v1 - ESVOC 1.1.j.v1 Manufacture of substance (industrial): solvent-borne - VP 1000-10000 Pa and WS > 1000 mg/L	**Initial release factor:** 1% **Final release factor:** 0.02% **Local release rate:** 80 kg/day **Explanation / Justification:** Emission factors to wastewater are conservatively calculated from equipment cleaning and substance aqueous solubility. Assumption of 10 m3 of wastewater generated per 1 tonne of substance is conservative. For further details, see FactSheet
Air	SpERC based same as above	**Initial release factor:** 5% **Final release factor:** 0.5% **Local release rate:** 2E3 kg/day **Explanation / Justification:** European Commission Technical Guidance Document on Risk Assessment (EUTGD) Part 2 – 2nd Edition (2003). Appendix 1, Table A1.1 (MC=3).
Soil	SpERC based same as above	**Final release factor:** 0.01% **Explanation / Justification:** ECHA Guidance on information requirements and chemical safety assessment, Chapter R.16: Environmental Exposure Estimation, Appendix R.16-1 Environmental Release Categories

Releases to waste

Release factor to waste from the process: 0%

This will be addressed at a later stage

9.1.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 64. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	**Local PEC:** 0.003 mg/L	RCR = 0.016
Sediment (freshwater)	**Local PEC:** 0.057 mg/kg dw	RCR = 0.058
Marine water	**Local PEC:** 0.003 mg/L	RCR = 0.174
Sediment (marine water)	**Local PEC:** 0.063 mg/kg dw	RCR = 0.638
Sewage treatment plant	**Local PEC:** 0.31 mg/L	RCR < 0.01
Agricultural soil	**Local PEC:** 0.07 mg/kg dw	RCR = 0.775
Man via environment - Inhalation	**Local PEC:** 0.457 mg/m³	RCR = 0.013
Man via environment - Oral	**Exposure via food consumption:** 0.005 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR = 0.015

Table 65. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	5.845E-4 mg/kg bw/day	0.02 mg/L
Fish	5.857E-5 mg/kg bw/day	0.036 mg/kg ww
Leaf crops	0.004 mg/kg bw/day	0.218 mg/kg ww
Root crops	3.497E-4 mg/kg bw/day	0.064 mg/kg ww
Meat	1.545E-6 mg/kg bw/day	3.593E-4 mg/kg ww
Milk	4.563E-6 mg/kg bw/day	5.694E-4 mg/kg ww

Conclusion on risk characterisation

The RCRs for the environmental compartments and for man via environment are all <1. Therefore, the risk is regarded to be adequately controlled.

9.1.2. Worker contributing scenario 1: Use in closed process, no likelihood of exposure (PROC 1)

9.1.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed system (minimal contact during routine operations)	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	

	Method
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.1.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 66. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, systemic, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	**0.034 mg/kg bw/day** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, acute	**0.034 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR < 0.01
Combined routes, systemic, long-term		RCR < 0.01
Combined routes, systemic, acute		RCR < 0.01

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.1.3. Worker contributing scenario 2: Use in closed, continuous process with occasional controlled exposure (PROC 2)

9.1.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed continuous process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0

	Method
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.1.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 67. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**1.37 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.124
Dermal, systemic, acute	**1.37 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.124
Combined routes, systemic, long-term		RCR = 0.205
Combined routes, systemic, acute		RCR = 0.286

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.1.4. Worker contributing scenario 3: Use in closed batch process (synthesis or formulation) (PROC 3)

9.1.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	

	Method
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed batch process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.1.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 68. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**0.69 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.063
Dermal, systemic, acute	**0.69 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.063
Combined routes, systemic, long-term		RCR = 0.224
Combined routes, systemic, acute		RCR = 0.385

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.1.5. Worker contributing scenario 4: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)

9.1.5.1. Conditions of use

	Method
Product (article) characteristics	

	Method
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.1.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 69. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**1.372 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.125
Dermal, systemic, acute	**1.372 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.125
Combined routes, systemic, long-term		RCR = 0.447
Combined routes, systemic, acute		RCR = 0.77

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.1.6. Worker contributing scenario 5: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.1.6.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.1.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 70. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.33
Combined routes, systemic, acute		RCR = 0.411

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.1.7. Worker contributing scenario 6: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.1.7.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.1.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 71. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.306
Combined routes, systemic, acute		RCR = 0.362

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.1.8. Worker contributing scenario 7: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)

9.1.8.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.1.8.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 72. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, systemic, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Inhalation, local, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, local, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Dermal, systemic, long-term	**1.371 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.125
Dermal, systemic, acute	**1.371 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.125

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Combined routes, systemic, long-term		RCR = 0.528
Combined routes, systemic, acute		RCR = 0.931

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.1.9. Worker contributing scenario 8: Use as laboratory reagent (PROC 15)

9.1.9.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.1.9.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 73. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Dermal, systemic, long-term	**0.34 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.031
Dermal, systemic, acute	**0.34 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.031
Combined routes, systemic, long-term		RCR = 0.192
Combined routes, systemic, acute		RCR = 0.354

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.2. Exposure scenario 2: Formulation - Distribution

Environment contributing scenario(s):	
Distribution	ERC 2
Worker contributing scenario(s):	
Use in closed process, no likelihood of exposure	PROC 1
Use in closed, continuous process with occasional controlled exposure	PROC 2
Use in closed batch process (synthesis or formulation)	PROC 3
Use in batch and other process (synthesis) where opportunity for exposure arises	PROC 4
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC 9
Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC 9
Use as laboratory reagent	PROC 15

Description of the technical process covered by the SpERC: ESVOC 1.1b.v1

Distribution of solvent-borne substances encompasses a wide range of activities such as the loading, repacking and storage of materials, etc. Substance losses are reduced through use of general and site-specific risk management measures to maintain workplace concentrations of airborne VOCs and particulates below respective OELs; and through use of closed or covered equipment/processes to minimize evaporative losses of VOCs. Substance losses to waste water are generally restricted to equipment cleaning as processes operate without contact with water Such uses and substance properties result in limited to no discharge to wastewater or to soil from the industrial site.

9.2.1. Environmental contributing scenario 1: Distribution

9.2.1.1. Conditions of use

spERC was modified

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 0.08 tonnes/day *Daily use amount default approach of the REACH guidance (R16.3.2): 0.2 % of regional tonnage based on default for wide dispersive use. Conservative assumption for number of emission days: 300 days/year (default wide dispersive use, ECHA R16.3.2)*
• Annual use at a site: <= 1.2E5 tonnes/year
• Percentage of EU tonnage used at regional scale: = 100 %
Technical and organisational conditions and measures
• Indoor/Outdoor use: Covers indoor and outdoor use
• Equipment cleaning: No release to wastewater from process as such, wastewater emissions limited to release generated from final equipment cleaning step using water
• On-site treatment of off-air: Typical measures to maintain workplace concentrations or airborne VOCs and particulates below respective OELS (e.g. thermal wet scrubber - gas removal and/or air filtration -

particle removal and/or thermal oxidation and/or vapour recovery - adsorption)
• On-site treament of wastewater: Not applied [Effectiveness Water: 0%] *spERC was modified: On-site treatment of wastewater was removed*
• On-site treatment of off-air: Vapor recovery (adsorption ...) [Effectiveness Air: 90%]
• Process efficiency: Process optimized for efficient use of raw materials
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 88.85%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.2.1.2. Releases

The local releases to the environment are reported in the following table.

Table 74. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based ESVOC 1.1b.v1 - ESVOC 1.1b.c.v1 Distribution of substance - Industrial (solvent-borne) -VP > 100 Pa and WS > 10 mg/L	**Initial release factor:** 0.001% **Final release factor:** 0.001% **Local release rate:** 8E-4 kg/day **Explanation / Justification:** Cleaning a 25000 L road tanker typically consumes 2 m3 of water (OECD Series on Emission Scenario Documents, nr 24, July 2009). Thus, at an assumed substance density of 0.9 kg/L, 0.09 m3 of wastewater are used per 1 tonne of substance. Conservatively assuming product is release in the wastewater at the solubility limit, at 1 mg/L the resulting release fraction would be 9E-8 (i.e., 1 mg/L x 0.09 m3/tonne use x 1000 L/m3 x 1tonne/109 mg = 9E-8tonnes/tonne used.
Air	SpERC based same as above	**Initial release factor:** 0.1% **Final release factor:** 0.01% **Local release rate:** 0.008 kg/day **Explanation / Justification:** OECD Series on Emission Scenario Documents, Number 24. July 2009. Emission Scenario Documents on Transport and Storage of Chemicals. Maximum VOC fractional loss due to tanker filling is 0.002 (occurs during splash loading of road tankers; p. 40). Emission factors for losses to air during road tanker cleaning range from 0.00002 (substance with VP = 11 Pa) to 0.007 (substance with VP = 30000 Pa), based on 50L of residual substance left in a 25000L tanker (p. 56). Tanker cleaning consumes 1 – 3 m3 (typically 2 m3) of water, with the wastewater discharged to sewer following appropriate on-site treatment, which may consists of oil and grease interception, dissolved air flotation,or biological treatment (p. 54). Emissions to soil from the filling of (and storage in) tanks should be minimal (p. 45).

Release	Release factor estimation method	Explanation / Justification
Soil	SpERC based same as above	**Final release factor:** 0.001% **Explanation / Justification:** Emission factor represents a reasonable assumption (OECD Series on Emission Scenario Documents, nr 24, July 2009).

Releases to waste

Release factor to waste from the process: 0%

This will be addressed at a later stage

9.2.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 75. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	**Local PEC:** 2.772E-4 mg/L	RCR < 0.01
Sediment (freshwater)	**Local PEC:** 0.006 mg/kg dw	RCR < 0.01
Marine water	**Local PEC:** 2.525E-5 mg/L	RCR < 0.01
Sediment (marine water)	**Local PEC:** 5.06E-4 mg/kg dw	RCR < 0.01
Sewage treatment plant	**Local PEC:** 4.459E-5 mg/L	RCR < 0.01
Agricultural soil	**Local PEC:** 0.001 mg/kg dw	RCR = 0.016
Man via environment - Inhalation	**Local PEC:** 0.009 mg/m³	RCR < 0.01
Man via environment - Oral	**Exposure via food consumption:** 0.001 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR < 0.01

Table 76. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	5.312E-4 mg/kg bw/day	0.019 mg/L
Fish	4.582E-4 mg/kg bw/day	0.279 mg/kg ww
Leaf crops	7.565E-5 mg/kg bw/day	0.004 mg/kg ww
Root crops	7.215E-6 mg/kg bw/day	0.001 mg/kg ww
Meat	5.279E-8 mg/kg bw/day	1.228E-5 mg/kg ww
Milk	1.559E-7 mg/kg bw/day	1.946E-5 mg/kg ww

Conclusion on risk characterisation

The RCRs for the environmental compartments and for man via environment are all <1. Therefore, the risk is regarded to be adequately controlled.

9.2.2. Worker contributing scenario 1: Use in closed process, no likelihood of exposure (PROC 1)

9.2.2.1. Conditions of use

	Method
Product (article) characteristics	

	Method
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed system (minimal contact during routine operations)	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.2.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 77. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, systemic, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	**0.034 mg/kg bw/day** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, acute	**0.034 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR < 0.01
Combined routes, systemic, long-term		RCR < 0.01
Combined routes, systemic, acute		RCR < 0.01

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.2.3. Worker contributing scenario 2: Use in closed, continuous process with occasional

controlled exposure (PROC 2)

9.2.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed continuous process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.2.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 78. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**1.37 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.124
Dermal, systemic, acute	**1.37 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.124
Combined routes, systemic, long-term		RCR = 0.205
Combined routes, systemic, acute		RCR = 0.286

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.2.4. Worker contributing scenario 3: Use in closed batch process (synthesis or formulation) (PROC 3)

9.2.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed batch process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.2.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 79. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**0.69 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.063
Dermal, systemic, acute	**0.69 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.063
Combined routes, systemic, long-term		RCR = 0.224
Combined routes, systemic, acute		RCR = 0.385

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:

Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.2.5. Worker contributing scenario 4: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)

9.2.5.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.2.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 80. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**1.372 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.125
Dermal, systemic, acute	**1.372 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.125
Combined routes, systemic, long-term		RCR = 0.447
Combined routes, systemic, acute		RCR = 0.77

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.2.6. Worker contributing scenario 5: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.2.6.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.2.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 81. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool	RCR = 0.249

Route of exposure and type of effects	Exposure concentration	Risk characterisation
	(Exposure estimation based on ECHA guidance R.14))	
Combined routes, systemic, long-term		RCR = 0.33
Combined routes, systemic, acute		RCR = 0.411

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.2.7. Worker contributing scenario 6: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.2.7.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.2.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 82. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.306
Combined routes, systemic, acute		RCR = 0.362

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.2.8. Worker contributing scenario 7: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)

9.2.8.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.2.8.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 83. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, systemic, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Inhalation, local, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, local, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Dermal, systemic, long-term	**1.371 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.125
Dermal, systemic, acute	**1.371 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.125
Combined routes, systemic, long-term		RCR = 0.528
Combined routes, systemic, acute		RCR = 0.931

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.2.9. Worker contributing scenario 8: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)

9.2.9.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	

	Method
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.2.9.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 84. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**6.86 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.624
Dermal, systemic, acute	**6.86 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.624
Combined routes, systemic, long-term		RCR = 0.704
Combined routes, systemic, acute		RCR = 0.785

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.2.10. Worker contributing scenario 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)

9.2.10.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0

	Method
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.2.10.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 85. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**6.86 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.624
Dermal, systemic, acute	**6.86 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.624
Combined routes, systemic, long-term		RCR = 0.68
Combined routes, systemic, acute		RCR = 0.737

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value

9.2.11. Worker contributing scenario 10: Use as laboratory reagent (PROC 15)

9.2.11.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	

	Method
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.2.11.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 86. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**0.34 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.031
Dermal, systemic, acute	**0.34 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.031
Combined routes, systemic, long-term		RCR = 0.192
Combined routes, systemic, acute		RCR = 0.354

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.3. Exposure scenario 3: Formulation - Formulation

Environment contributing scenario(s):	
Formulation	ERC 2
Worker contributing scenario(s):	
Use in closed process, no likelihood of exposure	PROC 1
Use in closed, continuous process with occasional controlled exposure	PROC 2
Use in closed batch process (synthesis or formulation)	PROC 3
Use in batch and other process (synthesis) where opportunity for exposure arises	PROC 4
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	PROC 5
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	PROC 5
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC 9
Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC 9
Production of preparations or articles by tabletting, compression, extrusion, pelletisation	PROC 14
Production of preparations or articles by tabletting, compression, extrusion, pelletisation	PROC 14
Use as laboratory reagent	PROC 15

Description of the activities and technical processes covered in the exposure scenario:

spERC modified

Description of the technical process covered by the SpERC: ESVOC 2.2.v1

Formulation of solvent-borne substances encompasses a wide range of activities such as transfers, mixing, tabletting, compression, pelletilisation and sampling. Substance losses are reduced through use of general and site-specific risk management measures to maintain workplace concentrations of airborne VOCs and particulates below respective OELs; and through use of closed or covered equipment/processes to minimize evaporative losses of VOCs.
Substance losses to waste water are generally restricted to equipment cleaning as processes operate without contact with water Such uses and substance properties result in limited to no discharge to wastewater or to soil from the industrial site.

9.3.1. Environmental contributing scenario 1: Formulation

9.3.1.1. Conditions of use

spERC was modified

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 13.33 tonnes/day *spERC was modified: The daily use rate was decreased from 100 (maximum use rate based on sector*

knowledge) to 13.333 tonnes/day. 300 emission days were taken into account.
• Annual use at a site: <= 4E3 tonnes/year
• Percentage of EU tonnage used at regional scale: = 100 %
Technical and organisational conditions and measures
• Process efficiency: Process optimized for highly efficient use of raw materials (very minimal environmental release)
• Indoor/Outdoor use: Indoor use
• Equipment cleaning: No release to wastewater from process as such, wastewater emissions limited to release generated from final equipment cleaning step using water
• On-site treatment of off-air: Typical measures to maintain workplace concentrations or airborne VOCs and particulates below respective OELS (e.g. thermal wet scrubber - gas removal and/or air filtration - particle removal and/or thermal oxidation and/or vapour recovery - adsorption)
• On-site treament of wastewater: Acclimated biological treatment [Effectiveness Water: 90%] *spERC was modified: Efficiency of on-site treatment of wastewater was increased from 70% to 90%. However, the choice of the RMM leading to the recommended emission reduction is under the responsibility of the formulator of the substance.*
• On-site treatment of off-air: Not applied (No off-site treatment of air applied) [Effectiveness Air: 0%] *spERC was modified: On-site treatment of off-air was removed*
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 88.85%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: No *spERC modified: no application of the STP sludge on agricultural soil.*
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.3.1.2. Releases

The local releases to the environment are reported in the following table.

Table 87. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based ESVOC 2.2.v1 - ESVOC 2.2.e.v1 Formulation & (re)packing of substances and mixtures (industrial): solvent-borne - VP > 1000 Pa and WS > 1000 mg/L	**Initial release factor:** 0.5% **Final release factor:** 0.05% **Local release rate:** 6.667 kg/day **Explanation / Justification:** Emission factors to wastewater are conservatively calculated based on wastewater volume generated from cleaning operations and substance aqueous solubility Assumption of 5 m3 of wastewater generated per 1 tonne of substance used is relatively conservative (Data from OECD Lubricants & Lubricant Additives ESD (2004) suggest a reasonable worst case estimate of wastewater discharge for a blending plant (formulation) is 0.1 m3/tonne lubricant (-> OECD Series on Emission Scenario Documents, Number 10. November 2004. Emission Scenario Document on Lubricants

Release	Release factor estimation method	Explanation / Justification
		and Lubricant Additives); thus, assumed value of 5 m3/tonne represents a conservative estimate.). Example: 1 mg/L x 5 m3/tonne use x 1000 L/m3 x 1tonne/109mg = 0.000005 tonnes/tonne used. For WS range (e.g., 1-10 mg/L), the geometric mean (i.e., 3.2 mg/L) is used to calculate the fraction released. OECD Coatings ESD4 reports no releases of volatile substances to water. The values used here are consistent with those reported for dust.
Air	SpERC based same as above	**Initial release factor:** 2.5% **Final release factor:** 2.5% **Local release rate:** 333.3 kg/day **Explanation / Justification:** Estimates on the basis ofsubstance vapor pressure taken from EUTGD (2003) Appendix 1 (European Commission Technical Guidance Document on Risk Assessment (EUTGD) Part 2 – 2nd Edition (2003). Appendix 1 Polymers Industry, Table 2.1 (MC = 3)). These values are consistent with the range of emissions reported in OECD Coatings ESD (OECD Series on Emission Scenario Documents, Number 22. July 2009. Emission Scenario Documents on Coating Industry (Paint, Laquers and Varishes))and consistent with EU Solvent Emissions Directive after typical RMMs as further documented in Coatings SPERC Factsheet.
Soil	SpERC based same as above	**Final release factor:** 0.01% **Explanation / Justification:** ERC 2 default (ECHA Guidance on information requirements and chemical safety assessment, Chapter R.16: Environmental Exposure Estimation, Appendix R.16-1 – Environmental Release Categories)

Releases to waste

Release factor to waste from the process: 0%

This will be addressed at a later stage

9.3.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 88. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	**Local PEC:** 0.037 mg/L	RCR = 0.208
Sediment (freshwater)	**Local PEC:** 0.75 mg/kg dw	RCR = 0.765
Marine water	**Local PEC:** 0.004 mg/L	RCR = 0.208
Sediment (marine water)	**Local PEC:** 0.075 mg/kg dw	RCR = 0.764
Sewage treatment plant	**Local PEC:** 0.372 mg/L	RCR = 0.01
Agricultural soil	**Local PEC:** 0.012 mg/kg dw	RCR = 0.129
Man via environment - Inhalation	**Local PEC:** 0.076 mg/m³	RCR < 0.01
Man via environment - Oral	**Exposure via food consumption:** 0.002 mg/kg bw/day	RCR < 0.01

Protection target	Exposure concentration	Risk characterisation
Man via environment - combined routes		RCR < 0.01

Table 89. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	8.801E-4 mg/kg bw/day	0.031 mg/L
Fish	7.591E-4 mg/kg bw/day	0.462 mg/kg ww
Leaf crops	6.241E-4 mg/kg bw/day	0.036 mg/kg ww
Root crops	5.838E-5 mg/kg bw/day	0.011 mg/kg ww
Meat	2.902E-7 mg/kg bw/day	6.75E-5 mg/kg ww
Milk	8.574E-7 mg/kg bw/day	1.07E-4 mg/kg ww

Conclusion on risk characterisation

The RCRs for the environmental compartments and for man via environment are all <1. Therefore, the risk is regarded to be adequately controlled.

9.3.2. Worker contributing scenario 1: Use in closed process, no likelihood of exposure (PROC 1)

9.3.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed system (minimal contact during routine operations)	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.3.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 90. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	**0.034 mg/kg bw/day** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, acute	**0.034 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR < 0.01
Combined routes, systemic, long-term		RCR < 0.01
Combined routes, systemic, acute		RCR < 0.01

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.3.3. Worker contributing scenario 2: Use in closed, continuous process with occasional controlled exposure (PROC 2)

9.3.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed continuous process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.3.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 91. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**1.37 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.124
Dermal, systemic, acute	**1.37 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.124
Combined routes, systemic, long-term		RCR = 0.205
Combined routes, systemic, acute		RCR = 0.286

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.3.4. Worker contributing scenario 3: Use in closed batch process (synthesis or formulation) (PROC 3)

9.3.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed batch process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0

	Method
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.3.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 92. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**0.69 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.063
Dermal, systemic, acute	**0.69 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.063
Combined routes, systemic, long-term		RCR = 0.224
Combined routes, systemic, acute		RCR = 0.385

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.3.5. Worker contributing scenario 4: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)

9.3.5.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374)	TRA Workers 3.0

	Method
[Effectiveness Dermal: 80%]	
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.3.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 93. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**1.372 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.125
Dermal, systemic, acute	**1.372 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.125
Combined routes, systemic, long-term		RCR = 0.447
Combined routes, systemic, acute		RCR = 0.77

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.3.6. Worker contributing scenario 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)

9.3.6.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	

	Method
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.3.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 94. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.33
Combined routes, systemic, acute		RCR = 0.411

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.3.7. Worker contributing scenario 6: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)

9.3.7.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.3.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 95. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.306
Combined routes, systemic, acute		RCR = 0.362

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR’s are below 1 therefore risks are regarded to be adequately controlled.

9.3.8. Worker contributing scenario 7: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.3.8.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.3.8.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 96. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.33
Combined routes, systemic, acute		RCR = 0.411

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.3.9. Worker contributing scenario 8: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.3.9.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.3.9.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 97. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.306
Combined routes, systemic, acute		RCR = 0.362

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.3.10. Worker contributing scenario 9: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)

9.3.10.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.3.10.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 98. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, systemic, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Inhalation, local, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, local, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Dermal, systemic, long-term	**1.371 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.125
Dermal, systemic, acute	**1.371 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.125

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Combined routes, systemic, long-term		RCR = 0.528
Combined routes, systemic, acute		RCR = 0.931

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.3.11. Worker contributing scenario 10: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)

9.3.11.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.3.11.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 99. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**6.86 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.624
Dermal, systemic, acute	**6.86 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.624
Combined routes, systemic, long-term		RCR = 0.704
Combined routes, systemic, acute		RCR = 0.785

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.3.12. Worker contributing scenario 11: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)

9.3.12.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.3.12.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 100. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**6.86 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.624
Dermal, systemic, acute	**6.86 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.624
Combined routes, systemic, long-term		RCR = 0.68
Combined routes, systemic, acute		RCR = 0.737

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are regarded to be adequately controlled.

9.3.13. Worker contributing scenario 12: Production of preparations or articles by tabletting, compression, extrusion, pelletisation (PROC 14)

9.3.13.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.3.13.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 101. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**3.43 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.312
Dermal, systemic, acute	**3.43 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.312
Combined routes, systemic, long-term		RCR = 0.393
Combined routes, systemic, acute		RCR = 0.473

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.3.14. Worker contributing scenario 13: Production of preparations or articles by tabletting, compression, extrusion, pelletisation (PROC 14)

9.3.14.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0

	Method
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.3.14.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 102. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**3.43 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.312
Dermal, systemic, acute	**3.43 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.312
Combined routes, systemic, long-term		RCR = 0.368
Combined routes, systemic, acute		RCR = 0.425

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are regarded to be adequately controlled.

9.3.15. Worker contributing scenario 14: Use as laboratory reagent (PROC 15)

9.3.15.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0

	Method
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.3.15.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 103. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**0.34 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.031
Dermal, systemic, acute	**0.34 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.031
Combined routes, systemic, long-term		RCR = 0.192
Combined routes, systemic, acute		RCR = 0.354

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4. Exposure scenario 4: Use at industrial site - Use in coatings (ind)

Sector of use:
SU 5, Manufacture of textiles, leather, fur
SU 7, Printing and reproduction of recorded media

Environment contributing scenario(s):	
Use in coatings	ERC 4
Worker contributing scenario(s):	
Use in closed process, no likelihood of exposure	PROC 1
Use in closed, continuous process with occasional controlled exposure	PROC 2
Use in closed batch process (synthesis or formulation)	PROC 3
Use in batch and other process (synthesis) where opportunity for exposure arises	PROC 4
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	PROC 5
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	PROC 5
Industrial spraying	PROC 7
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Roller application or brushing	PROC 10
Roller application or brushing	PROC 10
Treatment of articles by dipping and pouring	PROC 13
Treatment of articles by dipping and pouring	PROC 13
Use as laboratory reagent	PROC 15

Description of the technical process covered by the SpERC: ESVOC 4.3a.v1

Industrial use of solvent-borne coatings encompasses a wide range of activities such as spraying, brushing, cleaning, etc. Substance losses are reduced through use of general and site-specific risk management measures to maintain workplace concentrations of airborne VOCs and particulates below respective OELs; and through use of closed or covered equipment/processes to minimize evaporative losses of VOCs.
Substance losses to waste water are generally restricted to equipment cleaning as processes operate without contact with water. Such uses and substance properties result in limited to no discharge to wastewater or to soil from the industrial site.

9.4.1. Environmental contributing scenario 1: Use in coatings

9.4.1.1. Conditions of use

spERC was modified

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 16.67 tonnes/day *spERC was modified: The daily use rate was decreased from 50 (maximum use rate based on sector knowledge) to 16.67 tonnes/day. 300 emission days were taken into account.*
• Annual use at a site: <= 5E3 tonnes/year

• Percentage of EU tonnage used at regional scale: = 100 %
Technical and organisational conditions and measures
• Indoor/Outdoor use: Indoor use
• Equipment cleaning: No release to wastewater from process as such, wastewater emissions limited to release generated from final equipment cleaning step using water
• On-site treatment of off-air: Typical measures to maintain workplace concentrations or airborne VOCs and particulates below respective OELS (e.g. thermal wet scrubber - gas removal and/or air filtration - particle removal and/or thermal oxidation and/or vapour recovery - adsorption)
• On-site treatment of off-air: Upgrade of the system in place or additional air treatment measures (Upgrade of the system in place or additional air treatment measures, such as wet scrubber and/or air filtration and/or thermal oxidation and/or vapour recovery systems, in order to achieve a reduction of the air emissions.) [Effectiveness Air: 90%] *spERC was modified: Efficiency of on-site Treatment of off-air was increased from 50% to 90%. However, the choice of the RMM leading to the recommended emission reduction is under the responsibility of the user of the substance.*
• On-site treament of wastewater: Acclimated biological treatment [Effectiveness Water: 99%] *spERC was modified: Efficiency of on-site treatment of wastewater was increased from 70% to 99%. However, the choice of the RMM leading to the recommended emission reduction is under the responsibility of the user of the substance.*
• Process efficiency: Process optimized for efficient use of raw materials
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 88.85%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: No
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.4.1.2. Releases

The local releases to the environment are reported in the following table.

Table 104. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based ESVOC 4.3a.v1 - ESVOC 4.3a.e.v1 Uses in Coatings (industrial): solvent-borne - WS > 1000 mg/L	**Initial release factor:** 2% **Final release factor:** 0.02% **Local release rate:** 3.333 kg/day **Explanation / Justification:** Emission factors to wastewater are conservatively calculated based on wastewater volume generated from blanket wash and cleaning of printing machines and substance aqueous solubility Assumption of 20 m3 of wastewater generated per 1 tonne of substance used is relatively conservative (Data from Ecoinvent 2.0 database suggest water use for offset printing and gravure printing are 1.14 and 3.54 m3/tonne solvent, respectively (original reference: Hischier R. 2007. Life cycle inventories of packaging and graphical paper. Final report ecoinvent data

Release	Release factor estimation method	Explanation / Justification
		v2.0. Volume 11. Swiss Centre for LCI, Empa – TSL. Dubendorf, CH.); thus, assumed value of 20 m3/tonnerepresents a conservative estimate). Example: 1 mg/L x 20 m3/tonne use x 1000 L/m3 x 1tonne/109mg = 0.00002 tonnes/tonne used. For WS range (e.g., 1-10 mg/L), the geometric mean (i.e., 3.2 mg/L) is used to calculate the fractionreleased.
Air	SpERC based same as above	**Initial release factor:** 98% **Final release factor:** 9.8% **Local release rate:** 1.633E3 kg/day **Explanation / Justification:** OECD Coatings ESD (OECD Series on Emission Scenario Documents, Number 22. July 2009. Emission Scenario Documents on Coating Industry (Paint, Laquers and Varishes).)
Soil	SpERC based same as above	**Final release factor:** 0% **Explanation / Justification:** OECD Coatings ESD (OECD Series on Emission Scenario Documents, Number 22. July 2009. Emission Scenario Documents on Coating Industry (Paint, Laquers and Varishes))

Releases to waste

Release factor to waste from the process: 0%

This will be addressed at a later stage

9.4.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 105. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	**Local PEC:** 0.019 mg/L	RCR = 0.105
Sediment (freshwater)	**Local PEC:** 0.378 mg/kg dw	RCR = 0.385
Marine water	**Local PEC:** 0.002 mg/L	RCR = 0.105
Sediment (marine water)	**Local PEC:** 0.038 mg/kg dw	RCR = 0.385
Sewage treatment plant	**Local PEC:** 0.186 mg/L	RCR < 0.01
Agricultural soil	**Local PEC:** 0.057 mg/kg dw	RCR = 0.632
Man via environment - Inhalation	**Local PEC:** 0.373 mg/m³	RCR = 0.01
Man via environment - Oral	**Exposure via food consumption:** 0.004 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR = 0.013

Table 106. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	4.766E-4 mg/kg bw/day	0.017 mg/L
Fish	3.829E-4 mg/kg bw/day	0.233 mg/kg ww
Leaf crops	0.003 mg/kg bw/day	0.178 mg/kg ww

Type of food	Estimated daily dose	Concentration in food
Root crops	2.851E-4 mg/kg bw/day	0.052 mg/kg ww
Meat	1.262E-6 mg/kg bw/day	2.934E-4 mg/kg ww
Milk	3.727E-6 mg/kg bw/day	4.65E-4 mg/kg ww

Conclusion on risk characterisation

The RCRs for the environmental compartments and for man via environment are all <1. Therefore, the risk is regarded to be adequately controlled.

9.4.2. Worker contributing scenario 1: Use in closed process, no likelihood of exposure (PROC 1)

9.4.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed system (minimal contact during routine operations)	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.4.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 107. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, systemic, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	**0.034 mg/kg bw/day** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, acute	**0.034 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR < 0.01
Combined routes, systemic,		RCR < 0.01

Route of exposure and type of effects	Exposure concentration	Risk characterisation
long-term		
Combined routes, systemic, acute		RCR < 0.01

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.3. Worker contributing scenario 2: Use in closed, continuous process with occasional controlled exposure (PROC 2)

9.4.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed continuous process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.4.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 108. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**1.37 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.124
Dermal, systemic, acute	**1.37 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.124
Combined routes, systemic, long-term		RCR = 0.205
Combined routes, systemic, acute		RCR = 0.286

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.4. Worker contributing scenario 3: Use in closed batch process (synthesis or formulation) (PROC 3)

9.4.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed batch process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.4.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 109. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**0.69 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.063
Dermal, systemic, acute	**0.69 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.063
Combined routes, systemic, long-term		RCR = 0.224
Combined routes, systemic, acute		RCR = 0.385

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.5. Worker contributing scenario 4: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)

9.4.5.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.4.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 110. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**1.372 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.125
Dermal, systemic, acute	**1.372 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.125
Combined routes, systemic, long-term		RCR = 0.447
Combined routes, systemic, acute		RCR = 0.77

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.6. Worker contributing scenario 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)

9.4.6.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0

	Method
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.4.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 111. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.33
Combined routes, systemic, acute		RCR = 0.411

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.7. Worker contributing scenario 6: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)

9.4.7.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0

	Method
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.4.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 112. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.306
Combined routes, systemic, acute		RCR = 0.362

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.8. Worker contributing scenario 7: Industrial spraying (PROC 7)

9.4.8.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	

	Method
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 95%] *Preferably use engineering controls to keep exposures below the DNEL. If these are not sufficient, then also use respiratory protection with APF of 10.*	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and upper wrists (1500 cm2)	TRA Workers 3.0

9.4.8.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 113. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**60.5 mg/mt** (TRA Workers 3.0)	RCR = 0.202
Inhalation, systemic, acute	**242 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, local, long-term	**60.5 mg/mt** (TRA Workers 3.0)	RCR = 0.202
Inhalation, local, acute	**242 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Dermal, systemic, long-term	**4.286 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.39
Dermal, systemic, acute	**4.286 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.39
Combined routes, systemic, long-term		RCR = 0.591
Combined routes, systemic, acute		RCR = 0.793

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.9. Worker contributing scenario 8: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.4.9.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.4.9.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 114. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.33
Combined routes, systemic, acute		RCR = 0.411

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.10. Worker contributing scenario 9: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.4.10.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.4.10.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 115. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.306
Combined routes, systemic, acute		RCR = 0.362

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.11. Worker contributing scenario 10: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)

9.4.11.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.4.11.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 116. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, systemic, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Inhalation, local, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, local, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Dermal, systemic, long-term	**1.371 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.125
Dermal, systemic, acute	**1.371 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.125

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Combined routes, systemic, long-term		RCR = 0.528
Combined routes, systemic, acute		RCR = 0.931

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.12. Worker contributing scenario 11: Roller application or brushing (PROC 10)

9.4.12.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.4.12.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 117. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**5.486 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.499
Dermal, systemic, acute	**5.486 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.499
Combined routes, systemic, long-term		RCR = 0.579
Combined routes, systemic, acute		RCR = 0.66

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.13. Worker contributing scenario 12: Roller application or brushing (PROC 10)

9.4.13.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.4.13.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 118. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**5.486 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.499
Dermal, systemic, acute	**5.486 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.499
Combined routes, systemic, long-term		RCR = 0.555
Combined routes, systemic, acute		RCR = 0.612

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.14. Worker contributing scenario 13: Treatment of articles by dipping and pouring (PROC 13)

9.4.14.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.4.14.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 119. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.306
Combined routes, systemic, acute		RCR = 0.362

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.15. Worker contributing scenario 14: Treatment of articles by dipping and pouring (PROC 13)

9.4.15.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	

	Method
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.4.15.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 120. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.33
Combined routes, systemic, acute		RCR = 0.411

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.4.16. Worker contributing scenario 15: Use as laboratory reagent (PROC 15)

9.4.16.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	

	Method
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.4.16.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 121. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**0.34 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.031
Dermal, systemic, acute	**0.34 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.031
Combined routes, systemic, long-term		RCR = 0.192
Combined routes, systemic, acute		RCR = 0.354

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5. Exposure scenario 5: Use by professional worker - Use in coatings (prof)

Environment contributing scenario(s):	
Use in coatings	ERC 8a
Worker contributing scenario(s):	
Use in closed process, no likelihood of exposure	PROC 1
Use in closed, continuous process with occasional controlled exposure	PROC 2
Use in closed batch process (synthesis or formulation)	PROC 3
Use in batch and other process (synthesis) where opportunity for exposure arises	PROC 4Use
in batch and other process (synthesis) where opportunity for exposure arises	PROC 4
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	PROC 5
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	PROC 5
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Roller application or brushing	PROC 10
Roller application or brushing	PROC 10
Non industrial spraying	PROC 11
Non industrial spraying	PROC 11
Non industrial spraying	PROC 11
Treatment of articles by dipping and pouring	PROC 13
Use as laboratory reagent	PROC 15
Hand-mixing with intimate contact and only PPE available	PROC 19
Hand-mixing with intimate contact and only PPE available	PROC 19

Description of the technical process covered by the SpERC: ESVOC 8.3b.v1_SU22_ERC8a

Uses in Coatings (wide dispersive use): solvent-borne

9.5.1. Environmental contributing scenario 1: Use in coatings

9.5.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily wide dispersive use: <= 5.479E-4 tonnes/day *Default substance use rate calculated as 0.05% (no geographical or temporal peaks in use) of Regional Tonnage based on default standard town population of 10000 inhabitants. 365 emission days/year assumed. (Default approach of the REACH guidance; ECHA Guidance on information requirements and chemical safety assessment, Chapter R.16: Environmental Exposure Estimation, Section R.16.3.2)*
• Percentage of EU tonnage used at regional scale: = 10 %
Technical and organisational conditions and measures

• Indoor/Outdoor use: Covers indoor and outdoor use
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 88.85%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.5.1.2. Releases

The local releases to the environment are reported in the following table.

Table 122. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based ESVOC 8.3b.v1_SU22_ERC8a - ESVOC 8.3b.v1 Uses in Coatings (wide dispersive use): solvent-borne - Uses in Coatings (wide dispersive use): solvent-borne	**Initial release factor:** 1% **Final release factor:** 1% **Local release rate:** 0.005 kg/day **Explanation / Justification:** OECD Coatings ESD (OECD Series on Emission Scenario Documents, Number 22. July 2009. Emission Scenario Documents on Coating Industry (Paint, Laquers and Varishes))
Air	SpERC based same as above	**Initial release factor:** 98% **Final release factor:** 98% **Explanation / Justification:** OECD Coatings ESD (OECD Series on Emission Scenario Documents, Number 22. July 2009. Emission Scenario Documents on Coating Industry (Paint, Laquers and Varishes)). Suggested in ESD that losses may range from 98 – 100%. Assumption is made that professional users will utilize the most efficient practices.
Soil	SpERC based same as above	**Final release factor:** 1% **Explanation / Justification:** 100% of substance is assumed to be released to the environment. Values derived on basis of mass conservation.

Releases to waste

Release factor to waste from the process: 0%

This will be addressed at a later stage

9.5.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 123. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation

Protection target	Exposure concentration	Risk characterisation
Freshwater	**Local PEC:** 3.033E-4 mg/L	RCR < 0.01
Sediment (freshwater)	**Local PEC:** 0.006 mg/kg dw	RCR < 0.01
Marine water	**Local PEC:** 2.786E-5 mg/L	RCR < 0.01
Sediment (marine water)	**Local PEC:** 5.583E-4 mg/kg dw	RCR < 0.01
Sewage treatment plant	**Local PEC:** 3.054E-4 mg/L	RCR < 0.01
Agricultural soil	**Local PEC:** 1.496E-4 mg/kg dw	RCR < 0.01
Man via environment - Inhalation	**Local PEC:** 1.051E-4 mg/m³	RCR < 0.01
Man via environment - Oral	**Exposure via food consumption:** 1.734E-5 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR < 0.01

Table 124. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	8.665E-6 mg/kg bw/day	3.033E-4 mg/L
Fish	7.474E-6 mg/kg bw/day	0.005 mg/kg ww
Leaf crops	8.599E-7 mg/kg bw/day	5.016E-5 mg/kg ww
Root crops	3.367E-7 mg/kg bw/day	6.139E-5 mg/kg ww
Meat	7.092E-10 mg/kg bw/day	1.649E-7 mg/kg ww
Milk	2.095E-9 mg/kg bw/day	2.614E-7 mg/kg ww

Conclusion on risk characterisation

The RCRs for the environmental compartments and for man via environment are all <1. Therefore, the risk is regarded to be adequately controlled.

9.5.2. Worker contributing scenario 1: Use in closed process, no likelihood of exposure (PROC 1)

9.5.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed system (minimal contact during routine operations)	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	

	Method
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.5.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 125. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, systemic, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	**0.034 mg/kg bw/day** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, acute	**0.034 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR < 0.01
Combined routes, systemic, long-term		RCR < 0.01
Combined routes, systemic, acute		RCR < 0.01

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.3. Worker contributing scenario 2: Use in closed, continuous process with occasional controlled exposure (PROC 2)

9.5.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed continuous process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0

	Method
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.5.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 126. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**1.37 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.124
Dermal, systemic, acute	**1.37 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.124
Combined routes, systemic, long-term		RCR = 0.447
Combined routes, systemic, acute		RCR = 0.77

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.4. Worker contributing scenario 3: Use in closed batch process (synthesis or formulation) (PROC 3)

9.5.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	

	Method
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed batch process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.5.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 127. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, systemic, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Inhalation, local, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, local, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Dermal, systemic, long-term	**0.69 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.063
Dermal, systemic, acute	**0.69 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.063
Combined routes, systemic, long-term		RCR = 0.466
Combined routes, systemic, acute		RCR = 0.869

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.5. Worker contributing scenario 4: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)

9.5.5.1. Conditions of use

	Method
Product (article) characteristics	

	Method
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.5.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 128. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**6.86 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.624
Dermal, systemic, acute	**6.86 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.624
Combined routes, systemic, long-term		RCR = 0.785
Combined routes, systemic, acute		RCR = 0.946

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.6. Worker contributing scenario 5: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)

9.5.6.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.5.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 129. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**6.86 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.624
Dermal, systemic, acute	**6.86 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.624
Combined routes, systemic, long-term		RCR = 0.68
Combined routes, systemic, acute		RCR = 0.737

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.7. Worker contributing scenario 6: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)

9.5.7.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.5.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 130. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.572
Combined routes, systemic, acute		RCR = 0.895

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.8. Worker contributing scenario 7: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)

9.5.8.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.5.8.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 131. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, systemic, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Inhalation, local, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.362

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Combined routes, systemic, acute		RCR = 0.475

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.9. Worker contributing scenario 8: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.5.9.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.5.9.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 132. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, systemic, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Inhalation, local, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.362
Combined routes, systemic, acute		RCR = 0.475

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.10. Worker contributing scenario 9: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.5.10.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%] *Preferably use engineering controls to keep exposures below the DNEL. If these are not sufficient, then also use respiratory protection with APF of 10.*	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.5.10.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 133. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.572
Combined routes, systemic, acute		RCR = 0.895

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.11. Worker contributing scenario 10: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)

9.5.11.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0

	Method
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.5.11.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 134. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.33
Combined routes, systemic, acute		RCR = 0.411

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.12. Worker contributing scenario 11: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)

9.5.12.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0

	Method
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.5.12.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 135. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.306
Combined routes, systemic, acute		RCR = 0.362

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.13. Worker contributing scenario 12: Roller application or brushing (PROC 10)

9.5.13.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0

	Method
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.5.13.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 136. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, systemic, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Inhalation, local, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Dermal, systemic, long-term	**5.486 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.499
Dermal, systemic, acute	**5.486 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.499
Combined routes, systemic, long-term		RCR = 0.612
Combined routes, systemic, acute		RCR = 0.725

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.14. Worker contributing scenario 13: Roller application or brushing (PROC 10)

9.5.14.1. Conditions of use

	Method
Product (article) characteristics	

	Method
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%] *Preferably use engineering controls to keep exposures below the DNEL. If these are not sufficient, then also use respiratory protection with APF of 10.*	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.5.14.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 137. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**2.743 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.743 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.572
Combined routes, systemic, acute		RCR = 0.895

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.15. Worker contributing scenario 14: Non industrial spraying (PROC 11)

9.5.15.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 20) [Effectiveness Inhal: 95%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and upper wrists (1500 cm2)	TRA Workers 3.0

9.5.15.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 138. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**50.82 mg/mt** (TRA Workers 3.0)	RCR = 0.169
Inhalation, systemic, acute	**203.3 mg/mt** (TRA Workers 3.0)	RCR = 0.339
Inhalation, local, long-term	**50.82 mg/mt** (TRA Workers 3.0)	RCR = 0.169
Inhalation, local, acute	**203.3 mg/mt** (TRA Workers 3.0)	RCR = 0.339
Dermal, systemic, long-term	**6.428 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.584
Dermal, systemic, acute	**6.428 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.584
Combined routes, systemic, long-term		RCR = 0.754
Combined routes, systemic, acute		RCR = 0.923

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.16. Worker contributing scenario 15: Non industrial spraying (PROC 11)

9.5.16.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and upper wrists (1500 cm2)	TRA Workers 3.0

9.5.16.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 139. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**29.04 mg/mt** (TRA Workers 3.0)	RCR = 0.097
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**29.04 mg/mt** (TRA Workers 3.0)	RCR = 0.097
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**6.428 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.584
Dermal, systemic, acute	**6.428 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.584
Combined routes, systemic, long-term		RCR = 0.681
Combined routes, systemic, acute		RCR = 0.907

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.17. Worker contributing scenario 16: Non industrial spraying (PROC 11)

9.5.17.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 20) [Effectiveness Inhal: 95%] *Preferably use engineering controls to keep exposures below DNEL*	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and upper wrists (1500 cm2)	TRA Workers 3.0

9.5.17.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 140. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**43.56 mg/mt** (TRA Workers 3.0)	RCR = 0.145
Inhalation, systemic, acute	**290.4 mg/mt** (TRA Workers 3.0)	RCR = 0.484
Inhalation, local, long-term	**43.56 mg/mt** (TRA Workers 3.0)	RCR = 0.145
Inhalation, local, acute	**290.4 mg/mt** (TRA Workers 3.0)	RCR = 0.484
Dermal, systemic, long-term	**3.857 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.351
Dermal, systemic, acute	**3.857 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.351

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Combined routes, systemic, long-term		RCR = 0.496
Combined routes, systemic, acute		RCR = 0.835

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.18. Worker contributing scenario 17: Treatment of articles by dipping and pouring (PROC 13)

9.5.18.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.5.18.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 141. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**58.08 mg/mt** (TRA Workers 3.0)	RCR = 0.194

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, acute	**232.3 mg/mt** (TRA Workers 3.0)	RCR = 0.387
Inhalation, local, long-term	**58.08 mg/mt** (TRA Workers 3.0)	RCR = 0.194
Inhalation, local, acute	**232.3 mg/mt** (TRA Workers 3.0)	RCR = 0.387
Dermal, systemic, long-term	**1.645 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.15
Dermal, systemic, acute	**1.645 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.149
Combined routes, systemic, long-term		RCR = 0.343
Combined routes, systemic, acute		RCR = 0.537

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.19. Worker contributing scenario 18: Use as laboratory reagent (PROC 15)

9.5.19.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.5.19.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 142. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**0.34 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.031
Dermal, systemic, acute	**0.34 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.031
Combined routes, systemic, long-term		RCR = 0.192
Combined routes, systemic, acute		RCR = 0.354

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

- Dermal, systemic, acute:
  Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.20. Worker contributing scenario 19: Hand-mixing with intimate contact and only PPE available (PROC 19)

9.5.20.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 20) [Effectiveness Inhal: 95%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0

	Method
• Skin surface potentially exposed: Two hands and forearms (1980 cm2)	TRA Workers 3.0

9.5.20.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 143. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**14.52 mg/mt** (TRA Workers 3.0)	RCR = 0.048
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**14.52 mg/mt** (TRA Workers 3.0)	RCR = 0.048
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**8.486 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.771
Dermal, systemic, acute	**8.486 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.772
Combined routes, systemic, long-term		RCR = 0.82
Combined routes, systemic, acute		RCR = 0.933

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.5.21. Worker contributing scenario 20: Hand-mixing with intimate contact and only PPE available (PROC 19)

9.5.21.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0

	Method
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and forearms (1980 cm2)	TRA Workers 3.0

9.5.21.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 144. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**20.33 mg/mt** (TRA Workers 3.0)	RCR = 0.068
Inhalation, systemic, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Inhalation, local, long-term	**20.33 mg/mt** (TRA Workers 3.0)	RCR = 0.068
Inhalation, local, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Dermal, systemic, long-term	**8.486 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.771
Dermal, systemic, acute	**8.486 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.772
Combined routes, systemic, long-term		RCR = 0.839
Combined routes, systemic, acute		RCR = 0.997

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

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9.6. Exposure scenario 6: Consumer Use - Use in coatings (consumer)

Environment contributing scenario(s):	
Use in coatings	ERC 8a
Consumer contributing scenario(s):	
Adhesives, sealants	PC 1
Anti-freeze and de-icing products	PC 4
Biocidal products (e.g. disinfectants, pest control)	PC 8
Coatings and paints, thinners, paint removes	PC 9a
Fillers, putties, plasters, modelling clay	PC 9b
Finger paints	PC 9c
Non-metal-surface treatment products	PC 15
Ink and Toners	PC 18
Leather tanning, dye, finishing, impregnation and care products	PC 23
Lubricants, greases, release products	PC 24
Polishes and wax blends	PC 31
Textile dyes, finishing and impregnating products; including bleaches and other processing aids	PC 34

Description of the technical process covered by the SpERC: ESVOC 8.3c.v1_ERC8a

Uses in Coatings (wide dispersive use): solvent-borne

9.6.1. Environmental contributing scenario 1: Use in coatings

9.6.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily wide dispersive use: <= 2.7E-4 tonnes/day *Default substance use rate calculated as 0.05% (no geographical or temporal peaks in use) of Regional Tonnage based on default standard town population of 10000 inhabitants. 365 emission days/year assumed. (Default approach of the REACH guidance; ECHA Guidance on information requirements and chemical safety assessment, Chapter R.16: Environmental Exposure Estimation, Section R.16.3.2)*
• Percentage of EU tonnage used at regional scale: = 10 %
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Municipal STP: Yes [Effectiveness Water: 88.85%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: Yes
• Receiving surface water flow rate: >= 1.8E4 m3/d
• Indoor/Outdoor use: Covers indoor and outdoor use

9.6.1.2. Releases

The local releases to the environment are reported in the following table.

Table 145. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based ESVOC 8.3c.v1_ERC8a - ESVOC 8.3c.v1 Uses in Coatings (wide dispersive use): solvent-borne - Uses in Coatings (wide dispersive use): solvent-borne	**Initial release factor:** 1% **Final release factor:** 1% **Local release rate:** 0.003 kg/day **Explanation / Justification:** OECD Coatings ESD (OECD Series on Emission Scenario Documents, Number 22. July 2009. Emission Scenario Documents on Coating Industry (Paint, Laquers and Varishes))
Air	SpERC based same as above	**Initial release factor:** 98.5% **Final release factor:** 98.5% **Explanation / Justification:** OECD Coatings ESD (OECD Series on Emission Scenario Documents, Number 22. July 2009. Emission Scenario Documents on Coating Industry (Paint, Laquers and Varishes)). Suggested in ESD that losses may range from 98 – 100%. Assumption is made that professional users will utilize the most efficient practices.
Soil	SpERC based same as above	**Final release factor:** 0.5% **Explanation / Justification:** 100% of substance is assumed to be released to the environment. Values derived on basis of mass conservation.

Releases to waste

Release factor to waste from the process: 0%

This will be addressed at a later stage

9.6.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 146. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	**Local PEC:** 2.878E-4 mg/L	RCR < 0.01
Sediment (freshwater)	**Local PEC:** 0.006 mg/kg dw	RCR < 0.01
Marine water	**Local PEC:** 2.631E-5 mg/L	RCR < 0.01
Sediment (marine water)	**Local PEC:** 5.273E-4 mg/kg dw	RCR < 0.01
Sewage treatment plant	**Local PEC:** 1.505E-4 mg/L	RCR < 0.01
Agricultural soil	**Local PEC:** 9.233E-5 mg/kg dw	RCR < 0.01
Man via environment - Inhalation	**Local PEC:** 1.05E-4 mg/m³	RCR < 0.01
Man via environment - Oral	**Exposure via food consumption:** 1.644E-5 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR < 0.01

Table 147. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	8.222E-6 mg/kg bw/day	2.878E-4 mg/L
Fish	7.092E-6 mg/kg bw/day	0.004 mg/kg ww

Type of food	Estimated daily dose	Concentration in food
Leaf crops	8.595E-7 mg/kg bw/day	5.014E-5 mg/kg ww
Root crops	2.588E-7 mg/kg bw/day	4.717E-5 mg/kg ww
Meat	6.907E-10 mg/kg bw/day	1.606E-7 mg/kg ww
Milk	2.04E-9 mg/kg bw/day	2.546E-7 mg/kg ww

Conclusion on risk characterisation

The RCRs for the environmental compartments and for man via environment are all <1. Therefore, the risk is regarded to be adequately controlled.

9.6.2. Consumer contributing scenario 1: Use in Coatings (Consumer)

9.6.2.1. Conditions of use

Section 1		Exposure Scenario Title
Title		**Use in coatings (consumer)**
Sector of Use (SU code)		21
Use Descriptor (PC codes)		PC 1, PC 4, PC 8, PC 9, PC 15, PC 18, PC 23, PC 24, PC 31, PC 34
Processes, tasks, activities covered		Covers the use in coatings (paints, inks, adhesives, etc.) including exposure during use (including product transfer and preparation, application by brush, spray by hand or similar methods) and equipment cleaning.
Environmental Release Category		ERC 8a
Specific Environmental Release Category		ESVOC spERC 8.3c.v1
Section 2		**Operational conditions and risk management measures**
Field for additional statements to explain scenario if required - pending better understanding from ECHA		
Section 2.1		**Control of consumer exposure**
Product characteristics		
Physical form of product		liquid
Vapour pressure (Pa)		1120
Concentration of substance in product		Unless otherwise stated, cover concentrations up to 100% [ConsOC1]
Amounts used		Unless otherwise stated, covers use amounts up to37500g [ConsOC2];covers skin contact area up to 6600cm2 [ConsOC5]
Frequency and duration of use/exposure		Unless otherwise stated, covers use frequency up to 365 days per year [ConsOC3];Unless otherwise stated, covers use frequency up to 4 times per day [ConsOC4];covers exposure up to 8 hours per event [ConsOC14]
Other Operational Conditions affecting exposure		Unless otherwise stated assumes use at ambient temperatures [ConsOC15]; assumes use in a 20 m^3 room [ConsOC11]; assumes use with typical ventilation [ConsOC8].
Section 2.1.1		**Product categories**

PC1:Adhesives, sealants--Glues, hobby use	OC	Unless otherwise stated, covers concentrations upto 30% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35,73 cm2 [ConsOC5]; for each use event, covers use amounts up to 9g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC1:Adhesives, sealants--Glues DIY-use (carpet glue, tile glue, wood parquet glue)	OC	Unless otherwise stated, covers concentrations upto 30% [ConsOC1]; covers use up to 1 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 110,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 6390g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 6,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC1:Adhesives, sealants--Glue from spray	OC	Unless otherwise stated, covers concentrations upto 30% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35,73 cm2 [ConsOC5]; for each use event, covers use amounts up to 85,05g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC1:Adhesives, sealants--Sealants	OC	Unless otherwise stated, covers concentrations upto 30% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35,73 cm2 [ConsOC5]; for each use event, covers use amounts up to 75g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 1,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC4_n:Anti-freeze and de-icing products--Washing car window	OC	Unless otherwise stated, covers concentrations upto 1% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 0,5g [ConsOC2]; Covers use in a one car garage (34m3) under typcial ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0,02hr/event[ConsOC14];

	RMM	No specific RMMs identified beyond those OCs stated
PC4_n:Anti-freeze and de-icing products--Pouring into radiator	OC	Unless otherwise stated, covers concentrations upto 10% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 2000g [ConsOC2]; Covers use in a one car garage (34m3) under typcial ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0,17hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC4_n:Anti-freeze and de-icing products--Lock de-icer	OC	Unless otherwise stated, covers concentrations upto 50% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 214,40 cm2 [ConsOC5]; for each use event, covers use amounts up to 4g [ConsOC2]; Covers use in a one car garage (34m3) under typcial ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0,25hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC8_n: Biocidal products (excipient use only for solvent products)--Laundry and dish washing products	OC	Unless otherwise stated, covers concentrations upto 5% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857,50 cm2 [ConsOC5]; for each use event, covers use amounts up to 15g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,50hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC8_n: Biocidal products (excipient use only for solvent products)--Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	OC	Unless otherwise stated, covers concentrations upto 5% [ConsOC1]; covers use up to 128 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857,50 cm2 [ConsOC5]; for each use event, covers use amounts up to 27g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,33hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC8_n: Biocidal products (excipient use only for solvent products)--Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)	OC	Unless otherwise stated, covers concentrations upto 15% [ConsOC1]; covers use up to 128 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 35g [ConsOC2]; covers use under typical household ventilation

		[ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,17hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9a:Coatings, paints, thinners,paint removers--Waterborne latex wall paint	OC	Unless otherwise stated, covers concentrations upto 1,5% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428,75 cm2 [ConsOC5]; for each use event, covers use amounts up to 2760g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2,20hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9a:Coatings, paints, thinners,paint removers--Solvent rich, high solid, waterborne paint	OC	Unless otherwise stated, covers concentrations upto 27,5% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428,75 cm2 [ConsOC5]; for each use event, covers use amounts up to 744g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2,20hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9a:Coatings, paints, thinners,paint removers--Aerosol spray can	OC	Unless otherwise stated, covers concentrations upto 50% [ConsOC1]; covers use up to 2 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 215g [ConsOC2]; Covers use in a one car garage (34m3) under typcial ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0,33hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9a:Coatings, paints, thinners,paint removers--Removers (paint-, glue-, wallpaper-, sealant-remover)	OC	Unless otherwise stated, covers concentrations upto 50% [ConsOC1]; covers use up to 3 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857,50 cm2 [ConsOC5]; for each use event, covers use amounts up to 491g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated

PC9b:Fillers, putties, plasters, modeling clay--Fillers and putty	OC	Unless otherwise stated, covers concentrations upto 2% [ConsOC1]; covers use up to 12 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35,73 cm2 [ConsOC5]; for each use event, covers use amounts up to 85g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9b:Fillers, putties, plasters, modeling clay--Plasters and floor equalizers	OC	Unless otherwise stated, covers concentrations upto 2% [ConsOC1]; covers use up to 12 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857,50 cm2 [ConsOC5]; for each use event, covers use amounts up to 13800g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9b:Fillers, putties, plasters, modeling clay--Modelling clay	OC	Unless otherwise stated, covers concentrations upto 1% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 254,40 cm2 [ConsOC5]; for each use event, assumes swallowed amount of 1g [ConsOC13]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9c:Finger paints --Finger paints	OC	Unless otherwise stated, covers concentrations upto 50% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 254,40 cm2 [ConsOC5]; for each use event, assumes swallowed amount of 1,35g [ConsOC13]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4,00hr/event[ConsOC14];
	RMM	Avoid using at a product concentration greater than 0,25% [ConsRMM1];
PC15_n: Non-metal surface treatment products--Waterborne latex wall paint	OC	Unless otherwise stated, covers concentrations upto 1,5% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428,75 cm2 [ConsOC5]; for each use event, covers use amounts up to 2760g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers

		exposure up to 2,20hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC15_n: Non-metal surface treatment products--Solvent rich, high solid, water borne paint	OC	Unless otherwise stated, covers concentrations upto 27,5% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428,75 cm2 [ConsOC5]; for each use event, covers use amounts up to 744g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2,20hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC15_n: Non-metal surface treatment products--Aerosol spray can	OC	Unless otherwise stated, covers concentrations upto 50% [ConsOC1]; covers use up to 2 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 215g [ConsOC2]; Covers use in a one car garage (34m3) under typcial ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0,33hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC15_n: Non-metal surface treatment products--Removers (paint-, glue-, wall paper-, sealant-remover)	OC	Unless otherwise stated, covers concentrations upto 50% [ConsOC1]; covers use up to 3 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857,50 cm2 [ConsOC5]; for each use event, covers use amounts up to 491g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC18_n: Ink and toners--Inks and toners.	OC	Unless otherwise stated, covers concentrations upto 10% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 71,40 cm2 [ConsOC5]; for each use event, covers use amounts up to 40g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2,20hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated

PC23_n: Leather tanning, dye, finishing, impregnation and care products--Polishes,wax / cream (floor, furniture, shoes)	OC	Unless otherwise stated, covers concentrations upto 50% [ConsOC1]; covers use up to 29 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 430,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 56g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 1,23hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC23_n: Leather tanning, dye, finishing, impregnation and care products--Polishes, spray (furniture, shoes)	OC	Unless otherwise stated, covers concentrations upto 50% [ConsOC1]; covers use up to 8 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 430,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 56g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,33hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC24: Lubricants, greases, and release products--Liquids	OC	Unless otherwise stated, covers concentrations upto 100% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 468,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 2200g [ConsOC2]; Covers use in a one car garage (34m3) under typcial ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0,17hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC24: Lubricants, greases, and release products--Pastes	OC	Unless otherwise stated, covers concentrations upto 20% [ConsOC1]; covers use up to 10 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 468,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 34g [ConsOC2]; Covers use in a one car garage (34m3) under typcial ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 4,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC24: Lubricants, greases, and release products--Sprays	OC	Unless otherwise stated, covers concentrations upto 50% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428,75 cm2 [ConsOC5]; for each use event, covers use amounts up to 73g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers

		exposure up to 0,17hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC31:Polishes and wax blends--Polishes, wax / cream (floor, furniture, shoes)	OC	Unless otherwise stated, covers concentrations upto 50% [ConsOC1]; covers use up to 29 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 430,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 142g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 1,23hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC31:Polishes and wax blends--Polishes, spray (furniture, shoes)	OC	Unless otherwise stated, covers concentrations upto 50% [ConsOC1]; covers use up to 8 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 430,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 35g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,33hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC34_n: Textile dyes, finishing and impregnating products--	OC	Unless otherwise stated, covers concentrations upto 10% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857,50 cm2 [ConsOC5]; for each use event, covers use amounts up to 115g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 1,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated

9.6.2.2. Exposure and risk for consumers

Table 148. Exposure levels after assessment of safe use – Use in coatings (consumer)

			TRA+ Predicted Exposure - including RMM when needed (substance specific)		
Relevant Use Sentinel Product	**Product sub Category Sentinels**	**Indicator for Basis of Exposure Estimate**	**Predicted Systemic Dermal Exposure (mg/kg/d)**	**Predicted Systemic Oral Exposure (mg/kg/d)**	**Predicted Systemic Inhalation Exposure (mg/m3)**

PC1:Adhesives, sealants	Glues, hobby use	Based upon daily use	0,00	0,00	8,52
PC1:Adhesives, sealants	Glues DIY-use (carpet glue, tile glue, wood parquet glue)	Based upon infrequent use + RMM	0,00	0,00	17,48
PC1:Adhesives, sealants	Glue from spray	Based upon infrequent use (<365 days/yr)	0,00	0,00	1,32
PC1:Adhesives, sealants	Sealants	Based upon daily use + RMM	0,00	0,00	35,25
PC4_n:Anti-freeze and de-icing products	Washing car window	Based upon daily use	0,00	0,00	0,00
PC4_n:Anti-freeze and de-icing products	Pouring into radiator	Based upon daily use + RMM	0,00	0,00	1,84
PC4_n:Anti-freeze and de-icing products	Lock de-icer	Based upon daily use + RMM	0,00	0,00	0,51
PC8_n: Biocidal products (excipient use only for solvent products)	Laundry and dish washing products	Based upon daily use	0,00	0,00	0,67
PC8_n: Biocidal products (excipient use only for solvent products)	Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	Based upon daily use + RMM	0,01	0,00	0,84
PC8_n: Biocidal products (excipient use only for solvent products)	Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)	Based upon daily use + RMM	0,00	0,00	1,77
PC9a:Coatings, paints, thinners,paint removers	Waterborne latex wall paint	Based upon infrequent use (<365 days/yr)	0,00	0,00	1,16
PC9a:Coatings, paints, thinners, paint removers	Solvent rich, high solid, water borne paint	Based upon infrequent use (<365 days/yr)	0,00	0,00	8,33

PC9a:Coatings, paints, thinners, paint removers	Aerosol spray can	Based upon infrequent use (<365 days/yr)	0,00	0,00	34,29
PC9a:Coatings, paints, thinners, paint removers	Removers (paint-, glue-, wall paper-, sealant-remover)	Based upon infrequent use + RMM	0,00	0,00	4,90
PC9b:Fillers, putties, plasters, modeling clay	Fillers and putty	Based upon daily use	0,00	0,00	5,37
PC9b:Fillers, putties, plasters, modeling clay	Plasters and floor equalizers	Based upon infrequent use + RMM	0,00	0,00	22,02
PC9b:Fillers, putties, plasters, modeling clay	Modelling clay	Based upon daily use + RMM	2,54	1,00	0,00
PC9c:Finger paints	Finger paints	Based upon daily use + RMM	0,64	0,34	0,00
PC15_n: Non-metal surface treatment products	Waterborne latex wall paint	Based upon infrequent use (<365 days/yr)	0,00	0,00	1,16
PC15_n: Non-metal surface treatment products	Solvent rich, high solid, water borne paint	Based upon infrequent use (<365 days/yr)	0,00	0,00	8,33
PC15_n: Non-metal surface treatment products	Aerosol spray can	Based upon infrequent use (<365 days/yr)	0,00	0,00	34,29
PC15_n: Non-metal surface treatment products	Removers (paint-, glue-, wall paper-, sealant-remover)	Based upon infrequent use + RMM	0,00	0,00	4,90
PC18_n: Ink and toners	Inks and toners.	Based upon daily use	0,01	0,00	10,18
PC23_n: Leather tanning, dye, finishing, impregnation and care products	Polishes, wax / cream (floor, furniture, shoes)	Based upon infrequent use + RMM	0,00	0,00	4,06

PC23_n: Leather tanning, dye, finishing, impregnation and care products	Polishes, spray (furniture, shoes)	Based upon infrequent use (<365 days/yr)	0,00	0,00	17,46
PC24: Lubricants, greases, and release products	Liquids	Based upon infrequent use (<365 days/yr)	0,00	0,00	4,05
PC24: Lubricants, greases, and release products	Pastes	Based upon infrequent use (<365 days/yr)	0,06	0,00	5,54
PC24: Lubricants, greases, and release products	Sprays	Based upon infrequent use (<365 days/yr)	0,00	0,00	12,29
PC31:Polishes and wax blends	Polishes, wax / cream (floor, furniture, shoes)	Based upon infrequent use + RMM	0,00	0,00	10,29
PC31:Polishes and wax blends	Polishes, spray (furniture, shoes)	Based upon infrequent use (<365 days/yr)	0,00	0,00	10,92
PC34_n: Textile dyes, finishing and impregnating products		Based upon daily use	0,00	0,00	18,02

n/a: not applicable

Risk charakterisation:

Table 149. Risk characterization - Use in coatings (consumer)

			Risk Characterization - including RMMs when needed (substance Specific)			
Relevant Use Sentinel Product	Product sub Category Sentinels	Indicator for Basis of Exposure Estimate	RCR systemic (dermal, based on mg/kg/d))	RCR systemic (oral, based on mg/kg/d))	RCR systemic (inhalation based on mg/m3)	RCR systemic (all routes)
PC1:Adhesives, sealants	Glues, hobby use	Based upon daily use	0,00	0,00	0,24	0,24
PC1:Adhesives, sealants	Glues DIY-use (carpet glue, tile glue, wood parquet glue)	Based upon infrequent use + RMM	0,00	0,00	0,49	0,49

PC1:Adhesives, sealants	Glue from spray	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,04	0,04
PC1:Adhesives, sealants	Sealants	Based upon daily use + RMM	0,00	0,00	0,99	0,99
PC4_n:Anti-freeze and de-icing products	Washing car window	Based upon daily use	0,00	0,00	0,00	0,00
PC4_n:Anti-freeze and de-icing products	Pouring into radiator	Based upon daily use + RMM	0,00	0,00	0,05	0,05
PC4_n:Anti-freeze and de-icing products	Lock de-icer	Based upon daily use + RMM	0,00	0,00	0,01	0,01
PC8_n: Biocidal products (excipient use only for solvent products)	Laundry and dish washing products	Based upon daily use	0,00	0,00	0,02	0,02
PC8_n: Biocidal products (excipient use only for solvent products)	Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	Based upon daily use + RMM	0,00	0,00	0,02	0,03
PC8_n: Biocidal products (excipient use only for solvent products)	Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)	Based upon daily use + RMM	0,00	0,00	0,05	0,05
PC9a:Coatings, paints, thinners,paint removers	Waterborne latex wall paint	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,03	0,03
PC9a:Coatings, paints, thinners, paint removers	Solvent rich, high solid, water borne paint	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,23	0,23
PC9a:Coatings, paints, thinners, paint removers	Aerosol spray can	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,96	0,96
PC9a:Coatings, paints, thinners, paint removers	Removers (paint-, glue-, wall paper-, sealant-remover)	Based upon infrequent use + RMM	0,00	0,00	0,14	0,14

PC9b:Fillers, putties, plasters, modeling clay	Fillers and putty	Based upon daily use	0,00	0,00	0,15	0,15
PC9b:Fillers, putties, plasters, modeling clay	Plasters and floor equalizers	Based upon infrequent use + RMM	0,00	0,00	0,62	0,62
PC9b:Fillers, putties, plasters, modeling clay	Modelling clay	Based upon daily use + RMM	0,42	0,50	0,00	0,92
PC9c:Finger paints	Finger paints	Based upon daily use + RMM	0,11	0,17	0,00	0,27
PC15_n: Non-metal surface treatment products	Waterborne latex wall paint	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,03	0,03
PC15_n: Non-metal surface treatment products	Solvent rich, high solid, water borne paint	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,23	0,23
PC15_n: Non-metal surface treatment products	Aerosol spray can	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,96	0,96
PC15_n: Non-metal surface treatment products	Removers (paint-, glue-, wall paper-, sealant-remover)	Based upon infrequent use + RMM	0,00	0,00	0,14	0,14
PC18_n: Ink and toners	Inks and toners.	Based upon daily use	0,00	0,00	0,29	0,29
PC23_n: Leather tanning, dye, finishing, impregnation and care products	Polishes, wax / cream (floor, furniture, shoes)	Based upon infrequent use + RMM	0,00	0,00	0,11	0,11
PC23_n: Leather tanning, dye, finishing, impregnation and care products	Polishes, spray (furniture, shoes)	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,49	0,49
PC24: Lubricants, greases, and release products	Liquids	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,11	0,11
PC24: Lubricants, greases, and release products	Pastes	Based upon infrequent use (<365 days/yr)	0,01	0,00	0,16	0,17
PC24: Lubricants, greases, and release products	Sprays	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,34	0,34

PC31:Polishes and wax blends	Polishes, wax / cream (floor, furniture, shoes)	Based upon infrequent use + RMM	0,00	0,00	0,29	0,29
PC31:Polishes and wax blends	Polishes, spray (furniture, shoes)	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,31	0,31
PC34_n: Textile dyes, finishingand impregnating products		Based upon daily use	0,00	0,00	0,50	0,50

n/a: not applicable

Conclusion on risk characterisation

All RCR's are below 1, therefore risks are regarded to be adequately controlled.

9.7. Exposure scenario 7: Use at industrial site - Use in cleaning agents (ind)

Sector of use:
SU 8, Manufacture of bulk, large scale chemicals (including petroleum products)
SU 9, Manufacture of fine chemicals

Environment contributing scenario(s):	
Use in cleaning agents	ERC 4
Worker contributing scenario(s):	
Use in closed process, no likelihood of exposure	PROC 1
Use in closed, continuous process with occasional controlled exposure	PROC 2
Use in closed batch process (synthesis or formulation)	PROC 3
Use in batch and other process (synthesis) where opportunity for exposure arises	PROC 4
Industrial spraying	PROC 7
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Roller application or brushing	PROC 10
Roller application or brushing	PROC 10
Treatment of articles by dipping and pouring	PROC 13
Treatment of articles by dipping and pouring	PROC 13

Description of the technical process covered by the SpERC: ESVOC 4.4a.v1

Industrial use of solvent-borne cleaning agents covers the use as a component of cleaning products including transfer from storage, pouring/unloading from drums or containers. Exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping, automated and by hand), related equipment cleaning and maintenance.
The dry nature of solvent cleaning uses accounts for the potentially high release to air and low release to wastewater and soil.

9.7.1. Environmental contributing scenario 1: Use in cleaning agents

9.7.1.1. Conditions of use

spERC was modified

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 5 tonnes/day *The substance maximum use rate in an operation (=Msperc or 5 tonnes/day) is a typical maximum site tonnage, based on sector knowledge. It is the maximum amount of substance that is delivered to a site in one week based on typical site capacity (e.g., one truck with a volume of 25 tonnes) 20 emission days per year were assumed (default for an industrial end use with tonnages < 1000 tonnes/year (ECHA Guidance on information requirements and chemical safety assessment, Chapter R.16: Environmental Exposure Estimation, Section R.16.3.2.1)).*
• Annual use at a site: <= 100 tonnes/year
• Percentage of EU tonnage used at regional scale: = 100 %
Technical and organisational conditions and measures

• Indoor/Outdoor use: Indoor use
• Process efficiency: Process optimized for efficient use of raw materials
• Equipment cleaning: No release to wastewater form process as such
• On-site treatment of off-air: Typical measures to maintain workplace concentrations or airborne VOCs and particulates below respective OELS (e.g. thermal wet scrubber - gas removal and/or air filtration - particle removal and/or thermal oxidation and/or vapour recovery - adsorption)
• On-site treatment of off-air: Upgrade of the system in place or additional air treatment measures (Upgrade of the system in place or additional air treatment measures, such as wet scrubber and/or air filtration and/or thermal oxidation and/or vapour recovery systems, in order to achieve a reduction of the air emissions.) [Effectiveness Air: 50%]
• On-site treament of wastewater: Not applied [Effectiveness Water: 0%] *spERC was modified: On-site treatment of wastewater was removed*
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 88.85%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.7.1.2. Releases

The local releases to the environment are reported in the following table.

Table 150. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based ESVOC 4.4a.v1 - ESVOC 4.4a.e.v1 Use in Cleaning Agents (industrial): solvent-borne - WS > 1000 mg/L	**Initial release factor:** 0.01% **Final release factor:** 0.01% **Local release rate:** 0.5 kg/day **Explanation / Justification:** Emission factors to wastewater are conservatively calculated based on wastewater volume generated from blanket wash and cleaning of printing machines and substance aqueous solubility. Assumption of 0.1 m3 of wastewater generated per 1 tonne of substance used is relatively conservative (No water is introduced in hydrocarbon cleaning applications as contact with water is undesirable (e.g. rust formation). An assumed value of 0.1 m3 /tonne represents a conservative estimate based on sector knowledge.). Example:1 mg/L x 0.1 m3/tonne use x 1000 L/m3 x 1tonne/109mg = 0.0000001 tonnes/tonne used. For WS range (e.g., 1-10 mg/L), the geometric mean (i.e., 3.2 mg/L) is used to calculate the fraction released.
Air	SpERC based same as above	**Initial release factor:** 100% **Final release factor:** 50% **Local release rate:** 2.5E3 kg/day **Explanation / Justification:** Conservative default
Soil	SpERC based	**Final release factor:** 0%

Release	Release factor estimation method	Explanation / Justification
	same as above	**Explanation / Justification:** Direct release to soil prohibited

Releases to waste

Release factor to waste from the process: 0%

This will be addressed at a later stage

9.7.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 151. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	**Local PEC:** 0.003 mg/L	RCR = 0.017
Sediment (freshwater)	**Local PEC:** 0.061 mg/kg dw	RCR = 0.062
Marine water	**Local PEC:** 3.034E-4 mg/L	RCR = 0.017
Sediment (marine water)	**Local PEC:** 0.006 mg/kg dw	RCR = 0.062
Sewage treatment plant	**Local PEC:** 0.028 mg/L	RCR < 0.01
Agricultural soil	**Local PEC:** 0.016 mg/kg dw	RCR = 0.179
Man via environment - Inhalation	**Local PEC:** 0.038 mg/m³	RCR < 0.01
Man via environment - Oral	**Exposure via food consumption:** 4.391E-4 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR < 0.01

Table 152. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	7.234E-5 mg/kg bw/day	0.003 mg/L
Fish	1.048E-5 mg/kg bw/day	0.006 mg/kg ww
Leaf crops	3.125E-4 mg/kg bw/day	0.018 mg/kg ww
Root crops	4.327E-5 mg/kg bw/day	0.008 mg/kg ww
Meat	1.3E-7 mg/kg bw/day	3.024E-5 mg/kg ww
Milk	3.842E-7 mg/kg bw/day	4.793E-5 mg/kg ww

Conclusion on risk characterisation

The RCRs for the environmental compartments and for man via environment are all <1. Therefore, the risk is regarded to be adequately controlled.

9.7.2. Worker contributing scenario 1: Use in closed process, no likelihood of exposure (PROC 1)

9.7.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0

	Method
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed system (minimal contact during routine operations)	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.7.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 153. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, systemic, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	**0.034 mg/kg bw/day** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, acute	**0.034 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR < 0.01
Combined routes, systemic, long-term		RCR < 0.01
Combined routes, systemic, acute		RCR < 0.01

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.7.3. Worker contributing scenario 2: Use in closed, continuous process with occasional controlled exposure (PROC 2)

9.7.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed continuous process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.7.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 154. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**1.37 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.124
Dermal, systemic, acute	**1.37 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.124
Combined routes, systemic, long-term		RCR = 0.205
Combined routes, systemic, acute		RCR = 0.286

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.7.4. Worker contributing scenario 3: Use in closed batch process (synthesis or formulation) (PROC 3)

9.7.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed batch process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.7.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 155. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**0.69 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.063
Dermal, systemic, acute	**0.69 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.063
Combined routes, systemic, long-term		RCR = 0.224
Combined routes, systemic, acute		RCR = 0.385

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.7.5. Worker contributing scenario 4: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)

9.7.5.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.7.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 156. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**1.372 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.125
Dermal, systemic, acute	**1.372 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.125
Combined routes, systemic, long-term		RCR = 0.447
Combined routes, systemic, acute		RCR = 0.77

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.7.6. Worker contributing scenario 5: Industrial spraying (PROC 7)

9.7.6.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 95%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and upper wrists (1500 cm2)	TRA Workers 3.0

9.7.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 157. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**60.5 mg/mt** (TRA Workers 3.0)	RCR = 0.202
Inhalation, systemic, acute	**242 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, local, long-term	**60.5 mg/mt** (TRA Workers 3.0)	RCR = 0.202
Inhalation, local, acute	**242 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Dermal, systemic, long-term	**4.286 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.39
Dermal, systemic, acute	**4.286 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.39
Combined routes, systemic, long-term		RCR = 0.591

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Combined routes, systemic, acute		RCR = 0.793

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.7.7. Worker contributing scenario 6: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.7.7.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.7.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 158. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.33
Combined routes, systemic, acute		RCR = 0.411

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.7.8. Worker contributing scenario 7: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.7.8.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.7.8.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 159. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.306
Combined routes, systemic, acute		RCR = 0.362

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.7.9. Worker contributing scenario 8: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)

9.7.9.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0

	Method
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.7.9.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 160. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, systemic, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Inhalation, local, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, local, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Dermal, systemic, long-term	**1.371 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.125
Dermal, systemic, acute	**1.371 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.125
Combined routes, systemic, long-term		RCR = 0.528
Combined routes, systemic, acute		RCR = 0.931

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.7.10. Worker contributing scenario 9: Roller application or brushing (PROC 10)

9.7.10.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374)	TRA Workers 3.0

	Method
[Effectiveness Dermal: 80%]	
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.7.10.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 161. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**5.486 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.499
Dermal, systemic, acute	**5.486 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.499
Combined routes, systemic, long-term		RCR = 0.579
Combined routes, systemic, acute		RCR = 0.66

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.7.11. Worker contributing scenario 10: Roller application or brushing (PROC 10)

9.7.11.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0

	Method
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.7.11.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 162. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**5.486 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.499
Dermal, systemic, acute	**5.486 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.499
Combined routes, systemic, long-term		RCR = 0.555
Combined routes, systemic, acute		RCR = 0.612

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.7.12. Worker contributing scenario 11: Treatment of articles by dipping and pouring (PROC 13)

9.7.12.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0

	Method
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.7.12.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 163. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.33
Combined routes, systemic, acute		RCR = 0.411

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.7.13. Worker contributing scenario 12: Treatment of articles by dipping and pouring (PROC 13)

9.7.13.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.7.13.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 164. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.306
Combined routes, systemic, acute		RCR = 0.362

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8. Exposure scenario 8: Use by professional worker - Use in cleaning agents (prof)

Environment contributing scenario(s):	
Use in cleaning agents	ERC 8a
Worker contributing scenario(s):	
Use in closed process, no likelihood of exposure	PROC 1
Use in closed, continuous process with occasional controlled exposure	PROC 2
Use in closed batch process (synthesis or formulation)	PROC 3
Use in batch and other process (synthesis) where opportunity for exposure arises	PROC 4Use in batch and other process (synthesis) where opportunity for exposure arises PROC 4Use in batch and other process (synthesis) where opportunity for exposure arises PROC 4Use in batch and other process (synthesis) where opportunity for exposure arises PROC 4
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Roller application or brushing	PROC 10
Roller application or brushing	PROC 10
Roller application or brushing	PROC 10
Non industrial spraying	PROC 11
Non industrial spraying	PROC 11
Treatment of articles by dipping and pouring	PROC 13
Treatment of articles by dipping and pouring	PROC 13
Treatment of articles by dipping and pouring	PROC 13

Description of the technical process covered by the SpERC: ESVOC 8.4b.v1_ERC8a

Use in Cleaning Agents (professional): solvent-borne

9.8.1. Environmental contributing scenario 1: Use in cleaning agents

9.8.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily wide dispersive use: <= 2.739E-4 tonnes/day *Default substance use rate calculated as 0.05% of regional tonnage based on default standard town population of 10000 inhabitants (no geographical or temporal peaks in use). Default 365 emission days assumed. (Default approach of the REACH guidance, ECHA Guidance on information requirements and*

chemical safety assessment Chapter R.16: Environmental Exposure Estimation, Section R.16.3.2)
• Percentage of EU tonnage used at regional scale: = 10 %
Technical and organisational conditions and measures
• Indoor/Outdoor use: Covers indoor and outdoor use
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 88.85%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.8.1.2. Releases

The local releases to the environment are reported in the following table.

Table 165. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based ESVOC 8.4b.v1_ERC8a - ESVOC 8.4b.v1 Use in Cleaning Agents (professional): solvent-borne - Use in Cleaning Agents (professional): solvent-borne	**Initial release factor:** 1E-4% **Final release factor:** 1E-4% **Local release rate:** 2.739E-7 kg/day **Explanation / Justification:** US EPA (1988). Cleaner Technologies Substitute Assessment: Professional Fabricare Processes, Chapter 4. Release and Exposure, 50pp., EPA 744-B-98-001.
Air	SpERC based same as above	**Initial release factor:** 2% **Final release factor:** 2% **Explanation / Justification:** Solvent Emissions Directive: Professional dry cleaning operations (EU Solvent Emissions Directive. Council Directive 1999/13/EC of March 11, 1999 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations OJL85-ppl-22.).
Soil	SpERC based same as above	**Final release factor:** 0% **Explanation / Justification:** US EPA (1988). Cleaner Technologies Substitute Assessment: Professional Fabricare Processes, Chapter 4. Release and Exposure, 50pp., EPA 744-B-98-001.

Releases to waste

Release factor to waste from the process: 0%

This will be addressed at a later stage

9.8.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 166. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	**Local PEC:** 2.727E-4 mg/L	RCR < 0.01
Sediment (freshwater)	**Local PEC:** 0.005 mg/kg dw	RCR < 0.01
Marine water	**Local PEC:** 2.48E-5 mg/L	RCR < 0.01
Sediment (marine water)	**Local PEC:** 4.971E-4 mg/kg dw	RCR < 0.01
Sewage treatment plant	**Local PEC:** 1.527E-8 mg/L	RCR < 0.01
Agricultural soil	**Local PEC:** 3.666E-5 mg/kg dw	RCR < 0.01
Man via environment - Inhalation	**Local PEC:** 1.05E-4 mg/m³	RCR < 0.01
Man via environment - Oral	**Exposure via food consumption:** 1.556E-5 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR < 0.01

Table 167. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	7.793E-6 mg/kg bw/day	2.727E-4 mg/L
Fish	6.721E-6 mg/kg bw/day	0.004 mg/kg ww
Leaf crops	8.592E-7 mg/kg bw/day	5.012E-5 mg/kg ww
Root crops	1.831E-7 mg/kg bw/day	3.337E-5 mg/kg ww
Meat	6.727E-10 mg/kg bw/day	1.564E-7 mg/kg ww
Milk	1.987E-9 mg/kg bw/day	2.479E-7 mg/kg ww

Conclusion on risk characterisation

The RCRs for the environmental compartments and for man via environment are all <1. Therefore, the risk is regarded to be adequately controlled.

9.8.2. Worker contributing scenario 1: Use in closed process, no likelihood of exposure (PROC 1)

9.8.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed system (minimal contact during routine operations)	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0

	Method
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.8.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 168. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, systemic, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, long-term	**0.048 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Inhalation, local, acute	**0.194 mg/mt** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	**0.034 mg/kg bw/day** (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, acute	**0.034 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR < 0.01
Combined routes, systemic, long-term		RCR < 0.01
Combined routes, systemic, acute		RCR < 0.01

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8.3. Worker contributing scenario 2: Use in closed, continuous process with occasional controlled exposure (PROC 2)

9.8.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed continuous process with occasional controlled exposure	TRA Workers 3.0

	Method
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.8.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 169. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**1.37 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.124
Dermal, systemic, acute	**1.37 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.124
Combined routes, systemic, long-term		RCR = 0.447
Combined routes, systemic, acute		RCR = 0.77

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8.4. Worker contributing scenario 3: Use in closed batch process (synthesis or formulation) (PROC 3)

9.8.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	

	Method
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed batch process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.8.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 170. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, systemic, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Inhalation, local, long-term	**121 mg/mt** (TRA Workers 3.0)	RCR = 0.403
Inhalation, local, acute	**484 mg/mt** (TRA Workers 3.0)	RCR = 0.807
Dermal, systemic, long-term	**0.69 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.063
Dermal, systemic, acute	**0.69 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.063
Combined routes, systemic, long-term		RCR = 0.466
Combined routes, systemic, acute		RCR = 0.869

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8.5. Worker contributing scenario 4: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)

9.8.5.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 1-5%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.8.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 171. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**1.372 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.125
Dermal, systemic, acute	**1.372 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.125
Combined routes, systemic, long-term		RCR = 0.286
Combined routes, systemic, acute		RCR = 0.447

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8.6. Worker contributing scenario 5: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)

9.8.6.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.8.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 172. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**101.6 mg/mt** (TRA Workers 3.0)	RCR = 0.339
Inhalation, systemic, acute	**406.6 mg/mt** (TRA Workers 3.0)	RCR = 0.678
Inhalation, local, long-term	**101.6 mg/mt** (TRA Workers 3.0)	RCR = 0.339
Inhalation, local, acute	**406.6 mg/mt** (TRA Workers 3.0)	RCR = 0.678
Dermal, systemic, long-term	**0.823 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.075
Dermal, systemic, acute	**0.823 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.075
Combined routes, systemic, long-term		RCR = 0.414
Combined routes, systemic, acute		RCR = 0.752

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8.7. Worker contributing scenario 6: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)

9.8.7.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%] *Preferably use engineering controls to keep exposures below the DNEL. If these are not sufficient, then also use respiratory protection with APF of 10.*	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.8.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 173. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**6.86 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.624
Dermal, systemic, acute	**6.86 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.624
Combined routes, systemic, long-term		RCR = 0.785
Combined routes, systemic, acute		RCR = 0.946

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are regarded to be adequately controlled.

9.8.8. Worker contributing scenario 7: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)

9.8.8.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.8.8.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 174. Exposure concentrations and risks for workers

Route of exposure and type of effects	**Exposure concentration**	**Risk characterisation**
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**6.86 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.624
Dermal, systemic, acute	**6.86 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.624
Combined routes, systemic, long-term		RCR = 0.68
Combined routes, systemic, acute		RCR = 0.737

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are regarded to be adequately controlled.

9.8.9. Worker contributing scenario 8: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.8.9.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 1-5%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.8.9.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 175. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Combined routes, systemic, long-term		RCR = 0.572
Combined routes, systemic, acute		RCR = 0.895

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8.10. Worker contributing scenario 9: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.8.10.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%] *Preferably use engineering controls to keep exposures below the DNEL. If these are not sufficient, then also use respiratory protection with APF of 10.*	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.8.10.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 176. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.572
Combined routes, systemic, acute		RCR = 0.895

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are regarded to be adequately controlled.

9.8.11. Worker contributing scenario 10: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)

9.8.11.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.8.11.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 177. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, systemic, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Inhalation, local, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.362
Combined routes, systemic, acute		RCR = 0.475

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are regarded to be adequately controlled.

9.8.12. Worker contributing scenario 11: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)

9.8.12.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 1-5%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	

	Method
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.8.12.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 178. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.411
Combined routes, systemic, acute		RCR = 0.572

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8.13. Worker contributing scenario 12: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)

9.8.13.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	

	Method
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.8.13.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 179. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**101.6 mg/mt** (TRA Workers 3.0)	RCR = 0.339
Inhalation, systemic, acute	**406.6 mg/mt** (TRA Workers 3.0)	RCR = 0.678
Inhalation, local, long-term	**101.6 mg/mt** (TRA Workers 3.0)	RCR = 0.339
Inhalation, local, acute	**406.6 mg/mt** (TRA Workers 3.0)	RCR = 0.678
Dermal, systemic, long-term	**1.645 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.15
Dermal, systemic, acute	**1.645 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.149
Combined routes, systemic, long-term		RCR = 0.488
Combined routes, systemic, acute		RCR = 0.827

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8.14. Worker contributing scenario 13: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)

9.8.14.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	

	Method
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] *Preferably use engineering controls to keep exposures below the DNEL. If these are not sufficient, then also use respiratory protection with APF of 10.*	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.8.14.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 180. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.33
Combined routes, systemic, acute		RCR = 0.411

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are regarded to be adequately controlled.

9.8.15. Worker contributing scenario 14: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC

8b)

9.8.15.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.8.15.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 181. Exposure concentrations and risks for workers

Route of exposure and type of effects	**Exposure concentration**	**Risk characterisation**
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.306
Combined routes, systemic, acute		RCR = 0.362

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are regarded to be adequately controlled.

9.8.16. Worker contributing scenario 15: Roller application or brushing (PROC 10)

9.8.16.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 1-5%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.8.16.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 182. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**1.097 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.1
Dermal, systemic, acute	**1.097 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.1
Combined routes, systemic, long-term		RCR = 0.422
Combined routes, systemic, acute		RCR = 0.745

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:

Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8.17. Worker contributing scenario 16: Roller application or brushing (PROC 10)

9.8.17.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%] *Preferably use engineering controls to keep exposures below the DNEL. If these are not sufficient, then also use respiratory protection with APF of 10.*	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.8.17.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 183. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**2.743 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.743 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.572

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Combined routes, systemic, acute		RCR = 0.895

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are regarded to be adequately controlled.

9.8.18. Worker contributing scenario 17: Roller application or brushing (PROC 10)

9.8.18.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.8.18.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 184. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, systemic, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Inhalation, local, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Dermal, systemic, long-term	**5.486 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.499
Dermal, systemic, acute	**5.486 mg/kg bw/day** (External Tool	RCR = 0.499

Route of exposure and type of effects	Exposure concentration	Risk characterisation
	(Exposure estimation based on ECHA guidance R.14))	
Combined routes, systemic, long-term		RCR = 0.612
Combined routes, systemic, acute		RCR = 0.725

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are regarded to be adequately controlled.

9.8.19. Worker contributing scenario 18: Non industrial spraying (PROC 11)

9.8.19.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 1-5%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%] *Preferably use engineering controls to keep exposures below the DNEL. If these are not sufficient, then also use respiratory protection with APF of 10.*	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and upper wrists (1500 cm2)	TRA Workers 3.0

9.8.19.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 185. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**2.143 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.195
Dermal, systemic, acute	**2.143 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.195
Combined routes, systemic, long-term		RCR = 0.518
Combined routes, systemic, acute		RCR = 0.84

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8.20. Worker contributing scenario 19: Non industrial spraying (PROC 11)

9.8.20.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 1-5%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and upper wrists (1500 cm2)	TRA Workers 3.0

9.8.20.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 186. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, systemic, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Inhalation, local, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Dermal, systemic, long-term	**2.143 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.195
Dermal, systemic, acute	**2.143 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.195
Combined routes, systemic, long-term		RCR = 0.308
Combined routes, systemic, acute		RCR = 0.421

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

- Dermal, systemic, acute:
  Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are regarded to be adequately controlled.

9.8.21. Worker contributing scenario 20: Treatment of articles by dipping and pouring (PROC 13)

9.8.21.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%] *Preferably use engineering controls to keep exposures below the DNEL. If these are not sufficient, then also use respiratory protection with APF of 10.*	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	

	Method
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.8.21.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 187. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**58.08 mg/mt** (TRA Workers 3.0)	RCR = 0.194
Inhalation, systemic, acute	**232.3 mg/mt** (TRA Workers 3.0)	RCR = 0.387
Inhalation, local, long-term	**58.08 mg/mt** (TRA Workers 3.0)	RCR = 0.194
Inhalation, local, acute	**232.3 mg/mt** (TRA Workers 3.0)	RCR = 0.387
Dermal, systemic, long-term	**1.645 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.15
Dermal, systemic, acute	**1.645 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.149
Combined routes, systemic, long-term		RCR = 0.343
Combined routes, systemic, acute		RCR = 0.537

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8.22. Worker contributing scenario 21: Treatment of articles by dipping and pouring (PROC 13)

9.8.22.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0

	Method
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.8.22.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 188. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**20.33 mg/mt** (TRA Workers 3.0)	RCR = 0.068
Inhalation, systemic, acute	**81.31 mg/mt** (TRA Workers 3.0)	RCR = 0.136
Inhalation, local, long-term	**20.33 mg/mt** (TRA Workers 3.0)	RCR = 0.068
Inhalation, local, acute	**81.31 mg/mt** (TRA Workers 3.0)	RCR = 0.136
Dermal, systemic, long-term	**8.226 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.748
Dermal, systemic, acute	**8.226 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.748
Combined routes, systemic, long-term		RCR = 0.816
Combined routes, systemic, acute		RCR = 0.883

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.8.23. Worker contributing scenario 22: Treatment of articles by dipping and pouring (PROC 13)

9.8.23.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 1-5%	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0

	Method
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0

9.8.23.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 189. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, systemic, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Inhalation, local, long-term	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, acute	**387.2 mg/mt** (TRA Workers 3.0)	RCR = 0.645
Dermal, systemic, long-term	**2.742 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.249
Dermal, systemic, acute	**2.742 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.249
Combined routes, systemic, long-term		RCR = 0.572
Combined routes, systemic, acute		RCR = 0.895

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR’s are below 1 therefore risks are regarded to be adequately controlled.

9.9. Exposure scenario 9: Consumer Use - Use in cleaning agents (consumer)

Environment contributing scenario(s):	
Use in cleaning agents	ERC 8a
Consumer contributing scenario(s):	
Air care products	PC 3
Anti-freeze and de-icing products	PC 4
Biocidal products (e.g. disinfectants, pest control)	PC 8
Coatings and paints, thinners, paint removes	PC 9a
Fillers, putties, plasters, modelling clay	PC 9b
Finger paints	PC 9c
Lubricants, greases, release products	PC 24
Washing and cleaning products (including solvent based products)	PC 35
Welding and soldering products (with flux coatings or flux cores.), flux products	PC 38

Description of the technical process covered by the SpERC: ESVOC 8.4c.v1_ERC8a

Use in Cleaning Agents (consumer): solvent-borne

9.9.1. Environmental contributing scenario 1: Use in cleaning agents

9.9.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily wide dispersive use: <= 2.7E-4 tonnes/day *Default substance use rate calculated as 0.05% of regional tonnage based on default standard town population of 10000 inhabitants (no geographical or temporal peaks in use). Default 365 emission days assumed. (Default approach of the REACH guidance, ECHA Guidance on information requirements and chemical safety assessment Chapter R.16: Environmental Exposure Estimation, Section R.16.3.2)*
• Percentage of EU tonnage used at regional scale: = 10 %
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Municipal STP: Yes [Effectiveness Water: 88.85%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: Yes
• Receiving surface water flow rate: >= 1.8E4 m3/d
• Indoor/Outdoor use: Covers indoor and outdoor use

9.9.1.2. Releases

The local releases to the environment are reported in the following table.

Table 190. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based ESVOC 8.4c.v1_ERC8a - ESVOC 8.4c.v1 Use in Cleaning Agents (consumer): solvent-borne - Use in Cleaning Agents (consumer): solvent-borne	**Initial release factor:** 2.5% **Final release factor:** 2.5% **Local release rate:** 0.007 kg/day **Explanation / Justification:** 100% of substance is assumed to be released to the environment. Use of ERC8a and ERC8b defaults (ECHA Guidance on information requirements and chemical safety assessment, Chapter R.16: Environmental Exposure Estimation, Appendix R.16-1 Environmental Release Categories), with compartment allocation based on professional judgement and mass conservation.
Air	SpERC based same as above	**Initial release factor:** 95% **Final release factor:** 95% **Explanation / Justification:** 100% of substance is assumed to be released to the environment. Use of ERC8a and ERC8b defaults3, with compartment allocation based on professional judgement and mass conservation.
Soil	SpERC based same as above	**Final release factor:** 2.5% **Explanation / Justification:** 100% of substance is assumed to be released to the environment. Use of ERC8a and ERC8b defaults (ECHA Guidance on information requirements and chemical safety assessment, Chapter R.16: Environmental Exposure Estimation, Appendix R.16-1 Environmental Release Categories), with compartment allocation based on professional judgement and mass conservation.

Releases to waste

Release factor to waste from the process: 0%

This will be addressed at a later stage

9.9.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 191. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	**Local PEC:** 3.104E-4 mg/L	RCR < 0.01
Sediment (freshwater)	**Local PEC:** 0.006 mg/kg dw	RCR < 0.01
Marine water	**Local PEC:** 2.857E-5 mg/L	RCR < 0.01
Sediment (marine water)	**Local PEC:** 5.725E-4 mg/kg dw	RCR < 0.01
Sewage treatment plant	**Local PEC:** 3.762E-4 mg/L	RCR < 0.01
Agricultural soil	**Local PEC:** 1.758E-4 mg/kg dw	RCR < 0.01
Man via environment - Inhalation	**Local PEC:** 1.051E-4 mg/m³	RCR < 0.01
Man via environment - Oral	**Exposure via food consumption:** 1.775E-5 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR < 0.01

Table 192. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	8.867E-6 mg/kg bw/day	3.104E-4 mg/L
Fish	7.648E-6 mg/kg bw/day	0.005 mg/kg ww
Leaf crops	8.601E-7 mg/kg bw/day	5.017E-5 mg/kg ww
Root crops	3.724E-7 mg/kg bw/day	6.788E-5 mg/kg ww
Meat	7.177E-10 mg/kg bw/day	1.669E-7 mg/kg ww
Milk	2.12E-9 mg/kg bw/day	2.645E-7 mg/kg ww

Conclusion on risk characterisation

The RCRs for the environmental compartments and for man via environment are all <1. Therefore, the risk is regarded to be adequately controlled.

9.9.2. Consumer contributing scenario:

Section 1		**Exposure Scenario Title**
Title		**Use in Cleaning Agents (consumer)**
Sector of Use (SU code)		21
Use Descriptor (PC codes)		PC3, PC4, PC8 (excipient only), PC9, PC24, PC35, PC38
Processes, tasks, activities covered		Covers general exposures to consumers arising from the use of household products sold as washing and cleaning products, aerosols, coatings, de-icers, lubricants and air care products.
Environmental Release Category		ERC 8a
Specific Environmental Release Category		ESVOC spERC 8.4c.v1
Section 2		**Operational conditions and risk management measures**
Field for additional statements to explain scenario if required - pending better understanding from ECHA		
Section 2.1		**Control of consumer exposure**
Product characteristics		
Physical form of product		liquid
Vapour pressure (Pa)		1120
Concentration of substance in product		Unless otherwise stated, cover concentrations up to 100% [ConsOC1]
Amounts used		Unless otherwise stated, covers use amounts up to37500g [ConsOC2];covers skin contact area up to 6600cm2 [ConsOC5]
Frequency and duration of use/exposure		Unless otherwise stated, covers use frequency up to 365 days per year [ConsOC3];Unless otherwise stated, covers use frequency up to 4 times per day [ConsOC4];covers exposure up to 8 hours per event [ConsOC14]
Other Operational Conditions affecting exposure		Unless otherwise stated assumes use at ambient temperatures [ConsOC15]; assumes use in a 20 m^3 room [ConsOC11]; assumes use with typical ventilation [ConsOC8].
Section 2.1.1		**Product categories**

PC3:Air care products--Air care, instant action (aerosol sprays)	OC	Unless otherwise stated, covers concentrations up to50% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 4 times/day of use[ConsOC4]; for each use event, covers use amounts up to 0,1g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,25hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC3:Air care products--Air care, continuous action (solid and liquid)	OC	Unless otherwise stated, covers concentrations up to 10% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 35,70 cm2 [ConsOC5]; for each use event, covers use amounts up to 0,48g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 8,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC4_n:Anti-freeze and de-icing products--Washing car window	OC	Unless otherwise stated, covers concentrations up to 1% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 0,5g [ConsOC2]; Covers use in a one car garage (34m3) under typcial ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0,02hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC4_n:Anti-freeze and de-icing products--Pouring into radiator	OC	Unless otherwise stated, covers concentrations up to 10% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 2000g [ConsOC2]; Covers use in a one car garage (34m3) under typcial ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0,17hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC4_n:Anti-freeze and de-icing products--Lock de-icer	OC	Unless otherwise stated, covers concentrations up to 50% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 214,40 cm2 [ConsOC5]; for each use event, covers use amounts up to 4g [ConsOC2]; Covers use in a one car garage (34m3) under typcial ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0,25hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC8_n: Biocidal products (excipient use only for solvent products)--Laundry and dish washing products	OC	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857,50 cm2 [ConsOC5]; for each use event, covers use amounts up to 15g [ConsOC2]; covers use under

		typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,50hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC8_n: Biocidal products (excipient use only for solvent products)--Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	OC	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 128 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 857,50 cm2 [ConsOC5]; for each use event, covers use amounts up to 27g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,33hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC8_n: Biocidal products (excipient use only for solvent products)--Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)	OC	Unless otherwise stated, covers concentrations up to 15% [ConsOC1]; covers use up to 128 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 35g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,17hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9a:Coatings, paints, thinners,paint removers--Waterborne latex wall paint	OC	Unless otherwise stated, covers concentrations up to 1,5% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428,75 cm2 [ConsOC5]; for each use event, covers use amounts up to 2760g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2,20hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9a:Coatings, paints, thinners,paint removers--Solvent rich, high solid, water borne paint	OC	Unless otherwise stated, covers concentrations up to 27,5% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 428,75 cm2 [ConsOC5]; for each use event, covers use amounts up to 744g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2,20hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9a:Coatings, paints, thinners,paint removers--Aerosol spray can	OC	Unless otherwise stated, covers concentrations up to 50% [ConsOC1]; covers use up to 2 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 215g [ConsOC2]; Covers use in a one car garage (34m3) under typcial ventilation [ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0,33hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated

PC9a:Coatings, paints, thinners,paint removers--Removers (paint-, glue-, wall paper-, sealant-remover)	OC	Unless otherwise stated, covers concentrations up to50% [ConsOC1]; covers use up to 3 days/year[ConsOC3]; covers use up to 1 time/on day ofuse[ConsOC4]; covers skin contact area up to 857,50 cm2 [ConsOC5]; for each use event, covers use amounts up to 491g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9b:Fillers, putties, plasters, modeling clay--Fillers and putty	OC	Unless otherwise stated, covers concentrations up to2% [ConsOC1]; covers use up to 12 days/year[ConsOC3]; covers use up to 1 time/on day ofuse[ConsOC4]; covers skin contact area up to 35,73 cm2 [ConsOC5]; for each use event, covers use amounts up to 85g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9b:Fillers, putties, plasters, modeling clay--Plasters and floor equalizers	OC	Unless otherwise stated, covers concentrations up to2% [ConsOC1]; covers use up to 12 days/year[ConsOC3]; covers use up to 1 time/on day ofuse[ConsOC4]; covers skin contact area up to 857,50 cm2 [ConsOC5]; for each use event, covers use amounts up to 13800g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 2,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC9b:Fillers, putties, plasters, modeling clay--Modelling clay	OC	Unless otherwise stated, covers concentrations up to1% [ConsOC1]; covers use up to 365days/year[ConsOC3]; covers use up to 1 time/on day ofuse[ConsOC4]; covers skin contact area up to 254,40 cm2 [ConsOC5]; for each use event, assumes swallowed amount of 1g [ConsOC13]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11];
	RMM	No specific RMMs identified beyond those OCs stated
PC9c:Finger paints --Finger paints	OC	Unless otherwise stated, covers concentrations up to50% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day ofuse[ConsOC4]; covers skin contact area up to 254,40 cm2 [ConsOC5]; for each use event, assumes swallowed amount of 1,35g [ConsOC13]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4,00hr/event[ConsOC14];
	RMM	Avoid using at a product concentration greater than 0,25% [ConsRMM1];
PC24: Lubricants, greases, and release products--Liquids	OC	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 4 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 468,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 2200g [ConsOC2]; Covers use in a one

		car garage (34m3) under typcial ventilation[ConsOC10]; covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0,17hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC24: Lubricants, greases, and release products--Pastes	OC	Unless otherwise stated, covers concentrations up to20% [ConsOC1]; covers use up to 10days/year[ConsOC3]; covers use up to 1 time/on day ofuse[ConsOC4]; covers skin contact area up to 468,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 34g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 4,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC24: Lubricants, greases, and release products--Sprays	OC	Unless otherwise stated, covers concentrations up to50% [ConsOC1]; covers use up to 6 days/year[ConsOC3]; covers use up to 1 time/on day ofuse[ConsOC4]; covers skin contact area up to 428,75 cm2 [ConsOC5]; for each use event, covers use amounts up to 73g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,17hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC35:Washing and cleaning products (including solvent based products)--Laundry and dish washing products	OC	Unless otherwise stated, covers concentrations up to5% [ConsOC1]; covers use up to 365days/year[ConsOC3]; covers use up to 1 time/on day ofuse[ConsOC4]; covers skin contact area up to 857,50 cm2 [ConsOC5]; for each use event, covers use amounts up to 15g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,50hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC35:Washing and cleaning products (including solvent based products)--Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	OC	Unless otherwise stated, covers concentrations up to5% [ConsOC1]; covers use up to 128days/year[ConsOC3]; covers use up to 1 time/on day ofuse[ConsOC4]; covers skin contact area up to 857,50 cm2 [ConsOC5]; for each use event, covers use amounts up to 27g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,33hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
PC35:Washing and cleaning products (including solvent based products)--Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)	OC	Unless otherwise stated, covers concentrations up to15% [ConsOC1]; covers use up to 128 days/year[ConsOC3]; covers use up to 1 time/on day ofuse[ConsOC4]; covers skin contact area up to 428,00 cm2 [ConsOC5]; for each use event, covers use amounts up to 35g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 0,17hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated

PC38_n: Welding and soldering products, flux products--	OC	Unless otherwise stated, covers concentrations up to20% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day ofuse[ConsOC4]; for each use event, covers use amounts up to 12g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m3[ConsOC11]; for each use event, covers exposure up to 1,00hr/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated

9.9.3. Exposure and risk for consumers

Table 193. Exposure levels after assessment of safe use – Use in cleaning agents (consumer)

			TRA+ Predicted Exposure - including RMM when needed (substance specific)		
Relevant Use Sentinel Product	Product sub Category Sentinels	**Indicator for Basis of Exposure Estimate**	Predicted Systemic Dermal Exposure (mg/kg/d)	Predicted Systemic Oral Exposure (mg/kg/d)	Predicted Systemic Inhalation Exposure (mg/m3)
			d	o	i
PC3:Air care products	Air care, instant action (aerosol **sprays**)	Based upon daily use	0,00	0,00	0,10
PC3:Air care products	Air care, continuous action (solid and liquid)	Based upon daily use	0,00	0,00	0,17
PC4_n:Anti-freeze and de-icing products	Washing car window	Based upon daily use	0,00	0,00	0,00
PC4_n:Anti-freeze and de-icing products	Pouring into radiator	Based upon daily use + RMM	0,00	0,00	1,84
PC4_n:Anti-freeze and de-icing products	Lock de-icer	Based upon daily use + RMM	0,00	0,00	0,51
PC8_n: Biocidal products (excipient use only for solvent products)	Laundry and dish washing products	Based upon daily use	0,00	0,00	0,67
PC8_n: Biocidal products (excipient use only for solvent products)	Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	Based upon daily use + RMM	0,01	0,00	0,84

PC8_n: Biocidal products (excipient use only for solvent products)	Cleaners, trigger **sprays** (all purpose cleaners, sanitary products, glass cleaners)	Based upon daily use + RMM	0,00	0,00	1,77
PC9a:Coatings, paints, thinners,paint removers	Waterborne latex wall paint	Based upon infrequent use (<365 days/yr)	0,00	0,00	1,16
PC9a:Coatings, paints, thinners,paint removers	Solvent rich, high solid, water borne paint	Based upon infrequent use (<365 days/yr)	0,00	0,00	8,33
PC9a:Coatings, paints, thinners,paint removers	Aerosol **spray** can	Based upon infrequent use (<365 days/yr)	0,00	0,00	34,29
PC9a:Coatings, paints, thinners,paint removers	Removers (paint-, glue-, wall paper-, sealant-remover)	Based upon infrequent use + RMM	0,00	0,00	4,90
PC9b:Fillers, putties, plasters, modeling clay	Fillers and putty	Based upon daily use	0,00	0,00	5,37
PC9b:Fillers, putties, plasters, modeling clay	Plasters and floor equalizers	Based upon infrequent use + RMM	0,00	0,00	22,02
PC9b:Fillers, putties, plasters, modeling clay	Modelling clay	Based upon daily use + RMM	2,54	1,00	0,00
PC9c:Finger paints	Finger paints	Based upon daily use + RMM	0,64	0,34	0,00
PC24: Lubricants, greases, and release products	Liquids	Based upon infrequent use (<365 days/yr)	0,00	0,00	4,05
PC24: Lubricants, greases, and release products	Pastes	Based upon infrequent use (<365 days/yr)	0,06	0,00	21,47
PC24: Lubricants, greases, and release products	**Sprays**	Based upon infrequent use (<365 days/yr)	0,00	0,00	12,29
PC35:Washing and cleaning products (including solvent based products)	Laundry and dish washing products	Based upon daily use	0,00	0,00	0,67

PC35:Washing and cleaning products (including solvent based products)	Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	Based upon daily use + RMM	0,01	0,00	0,84
PC35:Washing and cleaning products (including solvent based products)	Cleaners, trigger **sprays** (all purpose cleaners, sanitary products, glass cleaners)	Based upon daily use + RMM	0,00	0,00	1,77
PC38_n: Welding and soldering products, flux products		Based upon daily use	0,00	0,00	3,76

n/a: not applicable

Risk charakterisation:

Table 194. Risk characterization - Use in cleaning agents (consumer)

			Risk Characterization - including RMMs when needed (substance Specific)			
Relevant Use Sentinel Product	Product sub Category Sentinels	**Indicator for Basis of Exposure Estimate**	**RCR systemic (dermal, based on mg/kg/d))**	**RCR systemic (oral, based on mg/kg/d))**	**RCR systemic (inhalation based on mg/m3)**	**RCR systemic (all routes)**
			d	o	i	t
PC3:Air care products	Air care, instant action (aerosol **sprays**)	Based upon daily use	0,00	0,00	0,00	0,00
PC3:Air care products	Air care, continuous action (solid and liquid)	Based upon daily use	0,00	0,00	0,00	0,00
PC4_n:Anti-freeze and de-icing products	Washing car window	Based upon daily use	0,00	0,00	0,00	0,00
PC4_n:Anti-freeze and de-icing products	Pouring into radiator	Based upon daily use + RMM	0,00	0,00	0,05	0,05
PC4_n:Anti-freeze and de-icing products	Lock de-icer	Based upon daily use + RMM	0,00	0,00	0,01	0,01
PC8_n: Biocidal products (excipient use only for solvent products)	Laundry and dish washing products	Based upon daily use	0,00	0,00	0,02	0,02

PC8_n: Biocidal products (excipient use only for solvent products)	Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	Based upon daily use + RMM	0,00	0,00	0,02	0,03
PC8_n: Biocidal products (excipient use only for solvent products)	Cleaners, trigger **sprays** (all purpose cleaners, sanitary products, glass cleaners)	Based upon daily use + RMM	0,00	0,00	0,05	0,05
PC9a:Coatings, paints, thinners,paint removers	Waterborne latex wall paint	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,03	0,03
PC9a:Coatings, paints, thinners,paint removers	Solvent rich, high solid, water borne paint	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,23	0,23
PC9a:Coatings, paints, thinners,paint removers	Aerosol **spray** can	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,96	0,96
PC9a:Coatings, paints, thinners,paint removers	Removers (paint-, glue-, wall paper-, sealant-remover)	Based upon infrequent use + RMM	0,00	0,00	0,14	0,14
PC9b:Fillers, putties, plasters, modeling clay	Fillers and putty	Based upon daily use	0,00	0,00	0,15	0,15
PC9b:Fillers, putties, plasters, modeling clay	Plasters and floor equalizers	Based upon infrequent use + RMM	0,00	0,00	0,62	0,62
PC9b:Fillers, putties, plasters, modeling clay	Modelling clay	Based upon daily use + RMM	0,42	0,50	0,00	0,92
PC9c:Finger paints	Finger paints	Based upon daily use + RMM	0,11	0,17	0,00	0,27
PC24: Lubricants, greases, and	Liquids	Based upon	0,00	0,00	0,11	0,11

release products		infrequent use (<365 days/yr)				
PC24: Lubricants, greases, and release products	Pastes	Based upon infrequent use (<365 days/yr)	0,01	0,00	0,60	0,61
PC24: Lubricants, greases, and release products	**Sprays**	Based upon infrequent use (<365 days/yr)	0,00	0,00	0,34	0,34
PC35:Washing and cleaning products (including solvent based products)	Laundry and dish washing products	Based upon daily use	0,00	0,00	0,02	0,02
PC35:Washing and cleaning products (including solvent based products)	Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	Based upon daily use + RMM	0,00	0,00	0,02	0,03
PC35:Washing and cleaning products (including solvent based products)	Cleaners, trigger **sprays** (all purpose cleaners, sanitary products, glass cleaners)	Based upon daily use + RMM	0,00	0,00	0,05	0,05
PC38_n: Welding and soldering products, flux products		Based upon daily use	0,00	0,00	0,11	0,11

n/a: not applicable

Conclusion on risk characterisation

All RCR's are below 1, therefore risks are regarded to be adequately controlled.

9.10. Exposure scenario 10: Use at industrial site - Use in laboratories (ind)

Sector of use:
SU 8, Manufacture of bulk, large scale chemicals (including petroleum products)
SU 9, Manufacture of fine chemicals

Environment contributing scenario(s):	
Use in laboratories	ERC 4
Worker contributing scenario(s):	
Roller application or brushing	PROC 10
Roller application or brushing	PROC 10
Use as laboratory reagent	PROC 15

9.10.1. Environmental contributing scenario 1: Use in laboratories

9.10.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 0.05 tonnes/day
• Annual use at a site: <= 1 tonnes/year
• Percentage of EU tonnage used at regional scale: = 100 %
Technical and organisational conditions and measures
• On-site treament of wastewater: Acclimated biological treatment [Effectiveness Water: 90%] *The choice of the RMM leading to the recommended emission reduction is under the responsibility of the user of the substance.*
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 88.85%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: No *spERC modified: no application of the STP sludge on agricultural soil*
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.10.1.2. Releases

The local releases to the environment are reported in the following table.

Table 195. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	ERC based	**Initial release factor:** 100% **Final release factor:** 10% **Local release rate:** 5 kg/day
Air	ERC based	**Initial release factor:** 100% **Final release factor:** 100%

Release	Release factor estimation method	Explanation / Justification
		Local release rate: 50 kg/day
Soil	ERC based	**Final release factor:** 5%

9.10.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 196. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	**Local PEC:** 0.028 mg/L	RCR = 0.156
Sediment (freshwater)	**Local PEC:** 0.564 mg/kg dw	RCR = 0.575
Marine water	**Local PEC:** 0.003 mg/L	RCR = 0.156
Sediment (marine water)	**Local PEC:** 0.056 mg/kg dw	RCR = 0.574
Sewage treatment plant	**Local PEC:** 0.279 mg/L	RCR < 0.01
Agricultural soil	**Local PEC:** 1.536E-4 mg/kg dw	RCR < 0.01
Man via environment - Inhalation	**Local PEC:** 8.666E-4 mg/m³	RCR < 0.01
Man via environment - Oral	**Exposure via food consumption:** 1.036E-4 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR < 0.01

Table 197. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	5.141E-5 mg/kg bw/day	0.002 mg/L
Fish	4.434E-5 mg/kg bw/day	0.027 mg/kg ww
Leaf crops	7.091E-6 mg/kg bw/day	4.137E-4 mg/kg ww
Root crops	7.671E-7 mg/kg bw/day	1.398E-4 mg/kg ww
Meat	5.016E-9 mg/kg bw/day	1.167E-6 mg/kg ww
Milk	1.482E-8 mg/kg bw/day	1.849E-6 mg/kg ww

Conclusion on risk characterisation

The RCRs for the environmental compartments and for man via environment are all <1. Therefore, the risk is regarded to be adequately controlled.

9.10.2. Worker contributing scenario 1: Roller application or brushing (PROC 10)

9.10.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0

	Method
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.10.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 198. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, systemic, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, long-term	**24.2 mg/mt** (TRA Workers 3.0)	RCR = 0.081
Inhalation, local, acute	**96.8 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Dermal, systemic, long-term	**5.486 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.499
Dermal, systemic, acute	**5.486 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.499
Combined routes, systemic, long-term		RCR = 0.579
Combined routes, systemic, acute		RCR = 0.66

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.10.3. Worker contributing scenario 2: Roller application or brushing (PROC 10)

9.10.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0

	Method
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.10.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 199. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, systemic, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, long-term	**16.94 mg/mt** (TRA Workers 3.0)	RCR = 0.056
Inhalation, local, acute	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Dermal, systemic, long-term	**5.486 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.499
Dermal, systemic, acute	**5.486 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.499
Combined routes, systemic, long-term		RCR = 0.555
Combined routes, systemic, acute		RCR = 0.612

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.10.4. Worker contributing scenario 3: Use as laboratory reagent (PROC 15)

9.10.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.10.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 200. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**0.34 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.031
Dermal, systemic, acute	**0.34 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.031
Combined routes, systemic, long-term		RCR = 0.192
Combined routes, systemic, acute		RCR = 0.354

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.11. Exposure scenario 11: Use by professional worker - Use in laboratories (prof)

Environment contributing scenario(s):	
Use in laboratories	ERC 8a
Worker contributing scenario(s):	
Roller application or brushing	PROC 10
Roller application or brushing	PROC 10
Use as laboratory reagent	PROC 15

Description of the technical process covered by the SpERC: ESVOC 8.17.v1

Laboratory Reagents (professional): solvent-borne

9.11.1. Environmental contributing scenario 1: Use in laboratories

9.11.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily wide dispersive use: <= 1.37E-7 tonnes/day *Default substance use rate calculated as 0.05% (no geographical or temporal peaks in use) of Regional Tonnage based on default standard town population of 10000 inhabitants. 365 emission days/year assumed (Default approach of the REACH guidance; ECHA Guidance on information requirements and chemical safety assessment, Chapter R.16: Environmental Exposure Estimation, Section R.16.3.2)*
• Percentage of EU tonnage used at regional scale: = 10 %
Technical and organisational conditions and measures
• Indoor/Outdoor use: Covers indoor and outdoor use
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 88.85%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.11.1.2. Releases

The local releases to the environment are reported in the following table.

Table 201. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	SpERC based ESVOC 8.17.v1 - ESVOC 8.17.v1 Laboratory Reagents	**Initial release factor:** 50% **Final release factor:** 50% **Local release rate:** 6.85E-5 kg/day **Explanation / Justification:** 100% of substance is assumed to be released to the environment. Use of ERC8a and ERC8b defaults, with compartment allocation based on professional

Release	Release factor estimation method	Explanation / Justification
	(professional): solvent-borne - Laboratory Reagents (professional): solvent-borne	judgement and mass conservation (ECHA Guidance on information requirements and chemical safety assessment, Chapter R.16: Environmental Exposure Estimation, Appendix R.16-1 Environmental Release Categories).
Air	SpERC based same as above	**Initial release factor:** 50% **Final release factor:** 50% **Explanation / Justification:** 100% of substance is assumed to be released to the environment. Use of ERC8a and ERC8b defaults, with compartment allocation based on professional judgement and mass conservation (ECHA Guidance on information requirements and chemical safety assessment, Chapter R.16: Environmental Exposure Estimation, Appendix R.16-1 Environmental Release Categories).
Soil	SpERC based same as above	**Final release factor:** 0% **Explanation / Justification:** 100% of substance is assumed to be released to the environment. Use of ERC8a and ERC8b defaults, with compartment allocation based on professional judgement and mass conservation (ECHA Guidance on information requirements and chemical safety assessment, Chapter R.16: Environmental Exposure Estimation, Appendix R.16-1 Environmental Release Categories).

Releases to waste

Release factor to waste from the process: 0%

This will be addressed at a later stage

9.11.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 202. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	**Local PEC:** 2.731E-4 mg/L	RCR < 0.01
Sediment (freshwater)	**Local PEC:** 0.005 mg/kg dw	RCR < 0.01
Marine water	**Local PEC:** 2.484E-5 mg/L	RCR < 0.01
Sediment (marine water)	**Local PEC:** 4.979E-4 mg/kg dw	RCR < 0.01
Sewage treatment plant	**Local PEC:** 3.818E-6 mg/L	RCR < 0.01
Agricultural soil	**Local PEC:** 3.807E-5 mg/kg dw	RCR < 0.01
Man via environment - Inhalation	**Local PEC:** 1.05E-4 mg/m³	RCR < 0.01
Man via environment - Oral	**Exposure via food consumption:** 1.558E-5 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR < 0.01

Table 203. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	7.804E-6 mg/kg bw/day	2.731E-4 mg/L
Fish	6.731E-6 mg/kg bw/day	0.004 mg/kg ww

Type of food	Estimated daily dose	Concentration in food
Leaf crops	8.592E-7 mg/kg bw/day	5.012E-5 mg/kg ww
Root crops	1.85E-7 mg/kg bw/day	3.372E-5 mg/kg ww
Meat	6.731E-10 mg/kg bw/day	1.565E-7 mg/kg ww
Milk	1.988E-9 mg/kg bw/day	2.481E-7 mg/kg ww

Conclusion on risk characterisation

The RCRs for the environmental compartments and for man via environment are all <1. Therefore, the risk is regarded to be adequately controlled.

9.11.2. Worker contributing scenario 1: Roller application or brushing (PROC 10)

9.11.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Good general ventilation (3-5 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%]	TRA Workers 3.0
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.11.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 204. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Inhalation, systemic, acute	**271 mg/mt** (TRA Workers 3.0)	RCR = 0.452
Inhalation, local, long-term	**67.76 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Inhalation, local, acute	**271 mg/mt** (TRA Workers 3.0)	RCR = 0.452
Dermal, systemic, long-term	**5.486 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.499
Dermal, systemic, acute	**5.486 mg/kg bw/day** (External Tool	RCR = 0.499

Route of exposure and type of effects	Exposure concentration	Risk characterisation
	(Exposure estimation based on ECHA guidance R.14))	
Combined routes, systemic, long-term		RCR = 0.725
Combined routes, systemic, acute		RCR = 0.951

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.11.3. Worker contributing scenario 2: Roller application or brushing (PROC 10)

9.11.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• Containment: No	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374) [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm2)	TRA Workers 3.0

9.11.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 205. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, systemic, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, local, long-term	**33.88 mg/mt** (TRA Workers 3.0)	RCR = 0.113
Inhalation, local, acute	**135.5 mg/mt** (TRA Workers 3.0)	RCR = 0.226
Dermal, systemic, long-term	**5.486 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.499
Dermal, systemic, acute	**5.486 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.499
Combined routes, systemic, long-term		RCR = 0.612
Combined routes, systemic, acute		RCR = 0.725

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.11.4. Worker contributing scenario 3: Use as laboratory reagent (PROC 15)

9.11.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Process temperature (for liquid): <= 40 °C	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm2)	TRA Workers 3.0

9.11.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 206. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, systemic, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Inhalation, local, long-term	**48.4 mg/mt** (TRA Workers 3.0)	RCR = 0.161
Inhalation, local, acute	**193.6 mg/mt** (TRA Workers 3.0)	RCR = 0.323
Dermal, systemic, long-term	**0.34 mg/kg bw/day** (TRA Workers 3.0)	RCR = 0.031
Dermal, systemic, acute	**0.34 mg/kg bw/day** (External Tool (Exposure estimation based on ECHA guidance R.14))	RCR = 0.031
Combined routes, systemic, long-term		RCR = 0.192
Combined routes, systemic, acute		RCR = 0.354

Remarks on exposure data

External Tool (Exposure estimation based on ECHA guidance R.14)

%• Dermal, systemic, acute:
Exposure estimation for dermal long-term systemic was used as a conservative value.

Conclusion on risk characterisation

All RCR's are below 1 therefore risks are adequately controlled.

9.12. Exposure scenario 12: Consumer Use - Use in personal care products

Environment contributing scenario(s):	
Use in personal care products	ERC 8a

Explanation on the approach taken for the ES

According to article 14, REACh personal care products/ cosmetic products needs not to be assessed with regard to human health.

9.12.1. Environmental contributing scenario 1: Use in personal care products

9.12.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily wide dispersive use: <= 0.001 tonnes/day
• Percentage of EU tonnage used at regional scale: = 10 %
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Municipal STP: Yes [Effectiveness Water: 88.85%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: Yes
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.12.1.2. Releases

The local releases to the environment are reported in the following table.

Table 207. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	ERC based	**Initial release factor:** 100% **Final release factor:** 100% **Local release rate:** 1.1 kg/day
Air	ERC based	**Initial release factor:** 100% **Final release factor:** 100%
Soil	ERC based	**Final release factor:** 0%

9.12.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 208. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	**Local PEC:** 0.006 mg/L	RCR = 0.036
Sediment (freshwater)	**Local PEC:** 0.128 mg/kg dw	RCR = 0.131
Marine water	**Local PEC:** 6.377E-4 mg/L	RCR = 0.035
Sediment (marine water)	**Local PEC:** 0.013 mg/kg dw	RCR = 0.13

Protection target	Exposure concentration	Risk characterisation
Sewage treatment plant	**Local PEC:** 0.061 mg/L	RCR < 0.01
Agricultural soil	**Local PEC:** 0.023 mg/kg dw	RCR = 0.252
Man via environment - Inhalation	**Local PEC:** 1.191E-4 mg/m³	RCR < 0.01
Man via environment - Oral	**Exposure via food consumption:** 3.727E-4 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR < 0.01

Table 209. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	1.829E-4 mg/kg bw/day	0.006 mg/L
Fish	1.578E-4 mg/kg bw/day	0.096 mg/kg ww
Leaf crops	9.986E-7 mg/kg bw/day	5.825E-5 mg/kg ww
Root crops	3.104E-5 mg/kg bw/day	0.006 mg/kg ww
Meat	8.003E-9 mg/kg bw/day	1.861E-6 mg/kg ww
Milk	2.364E-8 mg/kg bw/day	2.95E-6 mg/kg ww

Conclusion on risk characterisation

The RCRs for the environmental compartments and for man via environment are all <1. Therefore, the risk is regarded to be adequately controlled.

10. RISK CHARACTERISATION RELATED TO COMBINED EXPOSURE

10.1. Human health

Not relevant.

10.1.1. Workers

Not relevant.

10.1.2. Consumer

Not relevant.

10.2. Environment (combined for all emission sources)

10.2.1. All uses (regional scale)

10.2.1.1. Total releases

The total releases to the environment from all the exposure scenarios covered are presented in the table below. This is the sum of the releases to the environments from all exposure scenarios addressed.

Table 210. Total releases to the environment per year from all life cycle stages:

Release route	Total releases per year
Water	2.139E6 kg/year
Air	1.108E7 kg/year
Soil	1.136E5 kg/year

10.2.1.2. Regional exposure

Environment

The regional predicted environmental concentration (PEC regional) and the related risk characterisation ratios when a PNEC is available are presented in the table below.

The PEC regional have been estimated with EUSES.

Table 211. Predicted regional exposure concentrations (Regional PEC)

Protection target	Regional PEC	RCR
Freshwater	2.727E-4 mg/L	< 0.01
Sediment (freshwater)	0.005 mg/kg dw	< 0.01
Marine water	2.48E-5 mg/L	< 0.01
Sediment (marine water)	4.43E-4 mg/kg dw	< 0.01
Air	1.05E-4 mg/m³	
Agricultural soil	3.665E-5 mg/kg dw	< 0.01

Remarks on risk characterisation for regional concentrations

All RCR's are below 1 therefore risks are adequately controlled.

Man via environment

The exposure to man via the environment from regional exposure and the related risk characterisation ratios are presented in the table below. The exposure concentration via inhalation is equal to the PEC air.

Table 212. Regional exposure to man via the environment

Route	Regional exposure	RCR
Inhalation	1.05E-4 mg/m³	< 0.01
Oral	1.563E-5 mg/kg bw/day	< 0.01
Combined routes		< 0.01

Remarks

The RCR is below 1 therefore the risk is adequately controlled.

10.2.2. Local exposure due to all wide dispersive uses

Environment

The predicted local environmental concentrations (PEC local) based on the releases from all widespread uses are reported in the table below together with the risk characterisation ratio when a PNEC is available. Those exposure estimates have been obtained with EUSES.

Table 213. Predicted environmental concentration and risk characterisation ratio for theenvironment due to all wide dispersive uses

Protection target	PEC local due to all wide dispersive uses	RCR
Freshwater	0.006 mg/L	0.036
Sediment (freshwater)	0.13 mg/kg dw	0.133
Marine water	6.461E-4 mg/L	0.036
Sediment (marine water)	0.013 mg/kg dw	0.132
Sewage treatment plant	0.062 mg/L	< 0.01
Agricultural soil	0.023 mg/kg dw	0.255

Remarks

All RCR's are below 1 therefore risks are adequately controlled.

Man via environment

The exposure to man via the environment based on the releases from all widespread uses are reported in the table below together with the risk characterisation ratio when a DNEL is available. Those exposure estimates have been obtained with EUSES.

Table 214. Exposure and risk characterisation ratio for man via the environment due to all wide dispersive uses

Protection target	Exposure concentration due to all wide dispersive uses	RCR
Inhalation	1.193E-4 mg/m³	< 0.01
Oral	3.776E-4 mg/kg bw/day	< 0.01
Combined routes		< 0.01

Remarks

The RCR is below 1 therefore the risk is adequately controlled.

10.2.3. Local exposure due to combined uses at a site

Not relevant