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

1.1. Product identifier

Product form	:	Substance
Name	:	Acetone
EC Index-No.	:	606-001-00-8
EC-No.	:	200-662-2
CAS-No.	:	67-64-1
REACH registration No	:	01-2119471330-49-0010
Formula	:	C3H6O

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

1.2.1. Relevant identified uses

Use of the substance/mixture : Manufacture, processing and distribution of substances and mixtures
Use in laboratories
Uses in Coatings
Use as binders and release agents
Rubber production and processing
Polymer manufacturing
Use in polymer processing
Use in Cleaning Agents
Use in Oil and Gas field drilling and production operations
Use in blowing agents
Use in mining chemicals
Cosmetic application only for premium acetone grade

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

NOVAPEX SAS
Usine de Roussillon - Rue Gaston Monmousseau ROUSSILLON
38556 SAINT MAURICE L'EXIL Cédex
FRANCE
T +33 4 74 11 38 50 - F +33 4 74 11 39 00
fds-novapex@seqens.com - www.seqens.com

1.4. Emergency telephone number

Country	Organisation/Company	Address	Emergency number	Comment
France	Standard Plateforme Chimique de Roussillon	38556 St Maurice l'Exil Cédex	+33 4 74 11 37 00	
Ireland	National Poisons Information Centre Beaumont Hospital	PO Box 1297 Beaumont Road 9 Dublin	+353 1 809 2566 (Healthcare professionals-24/7) +353 1 809 2166 (public, 8am - 10pm, 7/7)	
Malta	Medicines & Poisons Info Office	Mater Dei Hospital MSD 2090 Msida	+356 2545 6508	

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flam. Liq. 2	H225
Eye Irrit. 2	H319
STOT SE 3	H336

Full text of hazard classes, H- and EUH-statements: see section 16

Adverse physicochemical, human health and environmental effects

Highly flammable liquid and vapour. Causes serious eye irritation. May cause drowsiness or dizziness. Repeated exposure may cause skin dryness or cracking.

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :

GHS02 GHS07

Signal word (CLP) : Danger

Hazard statements (CLP) : H225 - Highly flammable liquid and vapour.
H319 - Causes serious eye irritation.
H336 - May cause drowsiness or dizziness.

Precautionary statements (CLP) : P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P243 - Take precautionary measures against static discharge.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P403+P235 - Store in a well-ventilated place. Keep cool.
P312 - Call a POISON CENTER if you feel unwell.

EUH-statements : EUH066 - Repeated exposure may cause skin dryness or cracking.

2.3. Other hazards

Other hazards which do not result in classification : Narcotic effect.

This substance does not meet the PBT criteria of REACH regulation, annex XIII
This substance does not meet the vPvB criteria of REACH regulation, annex XIII

The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

SECTION 3: Composition/information on ingredients

3.1. Substances

Substance type : Mono-constituent

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Acetone	CAS-No.: 67-64-1 EC-No.: 200-662-2 EC Index-No.: 606-001-00-8 REACH-no: 01-2119471330-49-0010	100	Flam. Liq. 2, H225 Eye Irrit. 2, H319 STOT SE 3, H336 EUH066

Full text of H- and EUH-statements: see section 16

3.2. Mixtures

Not applicable.

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : In all cases of doubt, or when symptoms persist, seek medical attention. Never give anything by mouth to an unconscious person.

First-aid measures after inhalation : Move the affected person away from the contaminated area and into the fresh air. Keep victim warm and rested. If the victim is unconscious : Place the victim in the recovery position. Call a doctor immediately, even if there are no immediate symptoms. If breathing stops, give artificial respiration.

First-aid measures after skin contact : Remove all contaminated clothing and footwear. Wash with soapy water. In case of redness or irritation, call a doctor.

First-aid measures after eye contact : Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Remove contact lenses, if present and easy to do. Continue rinsing. If irritation persists, consult an eye specialist.

First-aid measures after ingestion : Rinse mouth out with water. Never attempt to induce vomiting. Keep at rest. Get medical advice/attention. If possible show this sheet, if not available show packaging or label.

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

Symptoms/effects after inhalation : Headache. Nausea. Loss of consciousness.

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

Combat acidosis. Monitor alkali reserves. Monitor breathing. If not breathing, give artificial respiration. Risk of lung oedema.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Water spray. Dry powder. Carbon dioxide (CO2). Foam. Polyvalent foam.

Unsuitable extinguishing media : Strong water jet.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Highly flammable liquid and vapour. Vapour mixes readily with air, forming explosive mixtures. During combustion : Toxic fumes may be released. Carbon oxides (CO, CO2).

5.3. Advice for firefighters

Precautionary measures fire : Cool down the containers exposed to heat with a water spray. Contain the extinguishing fluids by bunding.

Protection during firefighting : Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

Other information : Temperature class : T1 (DIN 57165). Gas group : II A (DIN 57165). Fire class : B.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures : Avoid contact with skin and eyes. Do not breathe vapours. In case of important spillage : Only qualified personnel equipped with suitable protective equipment may intervene.

6.1.2. For emergency responders

Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

6.2. Environmental precautions

Contain the spilled material by bunding. Do not discharge into drains or rivers.

6.3. Methods and material for containment and cleaning up

For containment : Take up liquid spill into absorbent material, e.g.: sand, earth, vermiculite, kieselguhr, powdered limestone.
Methods for cleaning up : Wash non-recoverable remainder with large amounts of water.
Other information : Dispose of contaminated materials in accordance with current regulations.

6.4. Reference to other sections

For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Ensure good ventilation of the work station. Avoid contact with skin and eyes. Do not breathe vapours. Heavier than air, vapours may travel long distances along ground, ignite and flash back to source. Ground/bond container and receiving equipment. Avoid the build-up of electrostatic charge. Prevent unauthorised access. Do not smoke. Use only non-sparking tools.
Hygiene measures : Do not drink, eat or smoke in the workplace. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Take all necessary measures to avoid accidental discharge of products into drains and waterways due to the rupture of containers or transfer systems.
Storage conditions : Keep container tightly closed and dry. Protect from heat and direct sunlight. Keep away from ignition sources. Avoid the build-up of electrostatic charge.
Incompatible products : Strong oxidizing agents.
Incompatible materials : Some plastics.
Special rules on packaging : Store always product in container of same material as original container.
Packaging materials : Iron or steel.

7.3. Specific end use(s)

Solvent.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1 National occupational exposure and biological limit values

Acetone (67-64-1)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Acetone
IOEL TWA	1210 mg/m³
IOEL TWA [ppm]	500 ppm
Regulatory reference	COMMISSION DIRECTIVE 2000/39/EC
Ireland - Occupational Exposure Limits	
Local name	Acetone
OEL TWA [1]	1210 mg/m³
OEL TWA [2]	500 ppm
OEL STEL	1050 mg/m³

Acetone (67-64-1)	
OEL STEL [ppm]	200 ppm
Remark	IOELV (Indicative Occupational Exposure Limit Values)
Regulatory reference	Chemical Agents Code of Practice 2021
Ireland - Biological limit values	
Local name	Acetone
BLV	50 mg/l Parameter: acetone - Medium: urine - Sampling time: End of shift - Notations: Ns (Non-specific)
Regulatory reference	Biological Monitoring Guidelines (HSA, 2011)
Malta - Occupational Exposure Limits	
Local name	Acetone
OEL TWA	1210 mg/m³
OEL TWA [ppm]	500 ppm
Regulatory reference	S.L.424.24 - Chemical Agents at Work Regulations (L.N.356 of 2021)

8.1.2. Recommended monitoring procedures

No additional information available

8.1.3. Air contaminants formed

No additional information available

8.1.4. DNEL and PNEC

Acetone (67-64-1)	
DNEL/DMEL (Workers)	
Acute - local effects, inhalation	2420 mg/m³
Long-term - systemic effects, dermal	186 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	1210 mg/m³
DNEL/DMEL (General population)	
Long-term - systemic effects,oral	62 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	200 mg/m³
Long-term - systemic effects, dermal	62 mg/kg bodyweight/day
PNEC (Water)	
PNEC aqua (freshwater)	10.6 mg/l
PNEC aqua (marine water)	1.06 mg/l
PNEC aqua (intermittent, freshwater)	21 mg/l
PNEC (Sediment)	
PNEC sediment (freshwater)	30.4 mg/kg
PNEC sediment (marine water)	3.04 mg/kg
PNEC (Soil)	
PNEC soil	29.5 mg/kg
PNEC (STP)	
PNEC sewage treatment plant	100 mg/l

8.1.5. Control banding

No additional information available

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Appropriate engineering controls:
Ensure good ventilation of the work station. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

8.2.2. Personal protection equipment

8.2.2.1. Eye and face protection

Eye protection:
Face-shield. (EN 166)

8.2.2.2. Skin protection

Skin and body protection:
Protective clothing. Antistatic clothing. Safety foot-wear (EN 345-347)

Hand protection:
Chemical resistant gloves (according to European standard NF EN 374 or equivalent). Butyl-rubber protective gloves. Breakthrough time (min) : > 480. Layer thickness : >= 0,5 mm

8.2.2.3. Respiratory protection

Respiratory protection:
In case of insufficient ventilation, wear suitable respiratory equipment. Gas mask with filter type A X (EN 371)

8.2.2.4. Thermal hazards

No additional information available

8.2.3. Environmental exposure controls

No additional information available

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Colour	:	Colourless.
Appearance	:	Fluid.
Molecular mass	:	58.08 g/mol
Odour	:	Aromatic.
Odour threshold	:	13 ppm 47.5 mg/m³
Melting point	:	-95 °C
Freezing point	:	Not available
Boiling point	:	56 °C
Flammability	:	Not applicable. No data available
Explosive properties	:	No data available.
Explosive limits	:	2.15 – 13 vol %
Lower explosion limit	:	Not available
Upper explosion limit	:	Not available
Flash point	:	-18 °C (Closed cup)
Auto-ignition temperature	:	538 °C
Decomposition temperature	:	235 °C
pH	:	Not available
Viscosity, kinematic	:	Not applicable.
Viscosity, dynamic	:	0.33 mPa.s (20°C)
Solubility	:	Water: Soluble Organic solvent:Miscible in all proportions
Partition coefficient n-octanol/water (Log Kow)	:	Not available
Partition coefficient n-octanol/water (Log Pow)	:	-0.24 (20°C)
Vapour pressure	:	26.7 kPa (22,7°C)

Vapour pressure at 50 °C	:	Not available
Critical pressure	:	4700 kPa
Saturation concentration	:	550 g/m³
Density	:	Not available
Relative density	:	< 1 (20°C)
Relative vapour density at 20 °C	:	2
Particle size	:	Not applicable.
Particle size distribution	:	Not applicable.
Particle shape	:	Not applicable.
Particle aspect ratio	:	Not applicable.
Particle aggregation state	:	Not applicable.
Particle agglomeration state	:	Not applicable.
Particle specific surface area	:	Not applicable.
Particle dustiness	:	Not applicable.

9.2. Other information

9.2.1. Information with regard to physical hazard classes

No additional information available

9.2.2. Other safety characteristics

Minimum ignition energy	:	1.15 mJ
Relative evaporation rate (butylacetate=1)	:	5.6
Relative evaporation rate (ether=1)	:	2

SECTION 10: Stability and reactivity

10.1. Reactivity

To our knowledge, the product does not present any particular risk. Reacts with (some) bases.

10.2. Chemical stability

Stable at ambient temperature and under normal conditions of use.

10.3. Possibility of hazardous reactions

On exposure to high temperature, may decompose, releasing toxic gases.

10.4. Conditions to avoid

High temperature. No flames, no sparks. Eliminate all sources of ignition. Avoid the build-up of electrostatic charge.

10.5. Incompatible materials

Reacts violently with : Sulfonitric mixture. Chromic acid. Potassium permanganate. Peroxides. halogenated hydrocarbons. Reacts with : Nitric acid. Sodium hydroxide. Potassium hydroxide. Strong oxidizing agents. Attacks some forms of plastics, rubber, and coatings.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

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

Acute toxicity (oral)	:	Not classified (Based on available data, the classification criteria are not met)
Acute toxicity (dermal)	:	Not classified (Based on available data, the classification criteria are not met)
Acute toxicity (inhalation)	:	Not classified (Based on available data, the classification criteria are not met)
Additional information	:	On ingestion : Can occur: gastrointestinal disturbance

Acetone (67-64-1)	
LD50 oral rat	5800 mg/kg (OECD 401 method)

Acetone (67-64-1)	
LD50 dermal rat	> 15800 mg/kg
LC50 inhalation rat	76 mg/l/4h

Skin corrosion/irritation : Not classified (Based on available data, the classification criteria are not met)
Serious eye damage/irritation : Causes serious eye irritation.
Respiratory or skin sensitisation : Not classified (Based on available data, the classification criteria are not met)
Germ cell mutagenicity : Not classified (Based on available data, the classification criteria are not met)
Additional information : Not mutagenic (OECD 471, 473 & 476)
Carcinogenicity : Not classified (Based on available data, the classification criteria are not met)
Reproductive toxicity : Not classified (Based on available data, the classification criteria are not met)
Additional information : No observed effects (OECD 414)
STOT-single exposure : May cause drowsiness or dizziness.
STOT-repeated exposure : Not classified (Based on available data, the classification criteria are not met)
Additional information : Repeated exposure may cause skin dryness or cracking.
Aspiration hazard : Not classified (Based on available data, the classification criteria are not met)

Acetone (67-64-1)	
Viscosity, kinematic	Not applicable.

11.2. Information on other hazards

No additional information available

SECTION 12: Ecological information

12.1. Toxicity

Hazardous to the aquatic environment, short–term (acute) : Not classified (Based on available data, the classification criteria are not met)
Hazardous to the aquatic environment, long–term (chronic) : Not classified (Based on available data, the classification criteria are not met)

Acetone (67-64-1)	
LC50 fish	5540 mg/l/96h (Lepomis macrochirus)
LC50 other aquatic organisms	11000 mg/l/96h (Alburnus alburnus)
EC50 Daphnia	8800 mg/l/48 h (Daphnia pulex)
LC 50 (Earthworm)	0.1 – 1 µg/cm³ (Eisenia fetida, 48h)
EC50 other aquatic organisms	20000 mg/l/48 h (Ambystoma mexicanum)
NOEC (acute)	530 mg/l (Microcystis aeruginosa, 8h)
NOEC (chronic)	2212 mg/l (Daphnia pulex, 28 d)

12.2. Persistence and degradability

Acetone (67-64-1)	
Persistence and degradability	Readily biodegradable. 91 % biodegradation. / 28 days.
Chemical oxygen demand (COD)	2.21 g O2/g substance

12.3. Bioaccumulative potential

Acetone (67-64-1)	
BCF	3 (calculated value)
Partition coefficient n-octanol/water (Log Pow)	-0.24 (20°C)

Acetone (67-64-1)	
Bioaccumulative potential	Bioaccumulation unlikely.

12.4. Mobility in soil

Acetone (67-64-1)	
Mobility in soil	Very mobile
Organic Carbon Normalized Adsorption Coefficient (Log Koc)	0.17 (20 °C)
Ecology - soil	Slightly volatile (H=2929-3070 Pa.m3/mol - 25 °C).

12.5. Results of PBT and vPvB assessment

Acetone (67-64-1)
This substance does not meet the PBT criteria of REACH regulation, annex XIII
This substance does not meet the vPvB criteria of REACH regulation, annex XIII

12.6. Endocrine disrupting properties

No additional information available

12.7. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods : Dispose of in accordance with relevant local regulations. Incinerate at a licensed installation.

SECTION 14: Transport information

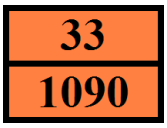
In accordance with ADR / IMDG / IATA / ADN / RID

ADR	IMDG	IATA	ADN	RID
14.1. UN number or ID number				
UN 1090	UN 1090	UN 1090	UN 1090	UN 1090
14.2. UN proper shipping name				
ACETONE	ACETONE	Acetone	ACETONE	ACETONE
14.3. Transport hazard class(es)				
3	3	3	3	3
				
14.4. Packing group				
II	II	II	II	II

ADR	IMDG	IATA	ADN	RID
14.5. Environmental hazards				
Dangerous for the environment: No	Dangerous for the environment: No Marine pollutant: No	Dangerous for the environment: No	Dangerous for the environment: No	Dangerous for the environment: No

14.6. Special precautions for user

Overland transport

Classification code (ADR)	:	F1
Limited quantities (ADR)	:	1l
Excepted quantities (ADR)	:	E2
Packing instructions (ADR)	:	P001, IBC02, R001
Mixed packing provisions (ADR)	:	MP19
Portable tank and bulk container instructions (ADR)	:	T4
Portable tank and bulk container special provisions (ADR)	:	TP1
Tank code (ADR)	:	LGBF
Vehicle for tank carriage	:	FL
Transport category (ADR)	:	2
Special provisions for carriage - Operation (ADR)	:	S2, S20
Hazard identification number (Kemler No.)	:	33
Orange plates	:	
Tunnel restriction code (ADR)	:	D/E

Transport by sea

Limited quantities (IMDG)	:	1 L
Excepted quantities (IMDG)	:	E2
Packing instructions (IMDG)	:	P001
IBC packing instructions (IMDG)	:	IBC02
Tank instructions (IMDG)	:	T4
Tank special provisions (IMDG)	:	TP1
EmS-No. (Fire)	:	F-E
EmS-No. (Spillage)	:	S-D
Stowage category (IMDG)	:	E
MFAG-No	:	127

Air transport

PCA Excepted quantities (IATA)	:	E2
PCA Limited quantities (IATA)	:	Y341
PCA limited quantity max net quantity (IATA)	:	1L
PCA packing instructions (IATA)	:	353
PCA max net quantity (IATA)	:	5L
CAO packing instructions (IATA)	:	364
CAO max net quantity (IATA)	:	60L
ERG code (IATA)	:	3H

Inland waterway transport

Classification code (ADN)	:	F1
Limited quantities (ADN)	:	1 L
Excepted quantities (ADN)	:	E2
Carriage permitted (ADN)	:	T
Equipment required (ADN)	:	PP, EX, A
Ventilation (ADN)	:	VE01
Number of blue cones/lights (ADN)	:	1

Rail transport

Classification code (RID)	:	F1
Limited quantities (RID)	:	1L
Excepted quantities (RID)	:	E2
Packing instructions (RID)	:	P001, IBC02, R001
Mixed packing provisions (RID)	:	MP19
Portable tank and bulk container instructions (RID)	:	T4
Portable tank and bulk container special provisions (RID)	:	TP1
Tank codes for RID tanks (RID)	:	LGBF
Transport category (RID)	:	2
Colis express (express parcels) (RID)	:	CE7
Hazard identification number (RID)	:	33

14.7. Maritime transport in bulk according to IMO instruments

Not applicable.

SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

No REACH Annex XVII restrictions
Acetone is not on the REACH Candidate List
Acetone is not on the REACH Annex XIV List
Acetone is not subject to Regulation (EU) No 649/2012 of the European Parliament and of the Council of 4 july 2012 concerning the export and import of hazardous chemicals.
Acetone is not subject to Regulation (EU) No 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants
Contains substance subject to Regulation (EU) 2019/1148 of the European Parliament and of the Council of 20 June 2019 on the marketing and use of explosives precursors.
ANNEX II REPORTABLE EXPLOSIVES PRECURSORS
List of substances on their own or in mixtures or in substances for which suspicious transactions and significant disappearances and thefts are to be reported to the relevant national contact point within 24 hours.

Name	CAS-No.	Combined Nomenclature code (CN)	Combined Nomenclature code for mixture without constituents which would determine classification under another CN code
Acetone	67-64-1	2914 11 00	ex 3824 99 92

Please see https://ec.europa.eu/home-affairs/system/files/2021-11/list_of_competent_authorities_and_national_contact_points_en.pdf

15.1.2. National regulations

No additional information available

15.2. Chemical safety assessment

A chemical safety assessment has been carried out

SECTION 16: Other information

Indication of changes:
This sheet was updated (refer to the date at the top of this page). SDS changed sections : 2, 12.

Data sources : CSR (Chemical safety report).

Full text of H- and EUH-statements:	
EUH066	Repeated exposure may cause skin dryness or cracking.
Eye Irrit. 2	Serious eye damage/eye irritation, Category 2

Full text of H- and EUH-statements:	
Flam. Liq. 2	Flammable liquids, Category 2
H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
STOT SE 3	Specific target organ toxicity – Single exposure, Category 3, Narcosis

SEQENS - SDS UE 2021

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

ANNEX TO THE SAFETY DATA SHEET

1. AC SE01: Formulation and (re)packaging

1.1. Title section

Formulation and (re)packaging

ES Ref.: AC SE01
ES Type: Worker

Association ref code: F

Environment		
CS 1	Formulation and (re)packaging	ERC2
Worker		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Storage	PROC1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 4	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	PROC3
CS 5	Chemical production where opportunity for exposure arises	PROC4
CS 6	Mixing operations (open systems)	PROC5
CS 7	Mixing operations (open systems)	PROC5
CS 8	Mixing operations (open systems)	PROC5
CS 9	Mixing operations (open systems)	PROC5
CS 10	Calendering (including Banburys)	PROC6
CS 11	Calendering (including Banburys)	PROC6
CS 12	Calendering (including Banburys)	PROC6
CS 13	Calendering (including Banburys)	PROC6
CS 14	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 15	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 16	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 17	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 18	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 19	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 20	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 21	Roller application or brushing	PROC10
CS 22	Roller application or brushing	PROC10
CS 23	Roller application or brushing	PROC10
CS 24	Roller application or brushing	PROC10
CS 25	Treatment of articles by dipping and pouring	PROC13
CS 26	Treatment of articles by dipping and pouring	PROC13
CS 27	Treatment of articles by dipping and pouring	PROC13
CS 28	Treatment of articles by dipping and pouring	PROC13
CS 29	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 30	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 31	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 32	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 33	Laboratory activities	PROC15
CS 34	Equipment cleaning and maintenance	PROC8a, PROC28

CS 35	Equipment cleaning and maintenance	PROC8a, PROC28
CS 36	Equipment cleaning and maintenance	PROC8a, PROC28
CS 37	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Formulation and (re)packaging (ERC2)

ERC2	Formulation into mixture

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	≤ 33.3 t/d
Annual site tonnage (tons/year):	≤ 10000 t/yr
Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil
Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

1.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

1.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

1.2.4. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics	
Physical form of product	Liquid

Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Use in closed batch process (synthesis or formulation). With occasional controlled exposure	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

1.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

1.2.6. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.7. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.8. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

1.2.9. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

1.2.10. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.11. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 320 °C

1.2.12. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.13. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

1.2.14. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 25 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.15. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

1.2.16. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.17. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

1.2.18. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.19. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

1.2.20. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

1.2.21. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.22. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

1.2.23. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.24. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

1.2.25. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.26. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

1.2.27. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

1.2.28. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.29. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.30. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

1.2.31. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
Indoor,and/or,outdoor	
Maximum process temperature	≤ 320 °C

1.2.32. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.33. Control of worker exposure: Laboratory activities (PROC15)

PROC15	Use as laboratory reagent

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

1.2.34. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

1.2.35. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.2.36. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	

Maximum process temperature	≤ 320 °C

1.2.37. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure Formulation and (re)packaging (ERC2)

Release route	Release rate	Release estimation method
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	0.5 %	ESVOC SPERC 2.2.v1
Release to waste water from process	166.5 kg/day	ESVOC SPERC 2.2.v1
Release fraction to air from process	2.5 %	ESVOC SPERC 2.2.v1
Release to air from process	832.5 kg/day	ESVOC SPERC 2.2.v1
Release fraction to soil from process	0.01 %	ESVOC SPERC 2.2.v1

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	1.785	10.6	0.168	EUSES v2.1.2
Marine water	mg/l	0.174	1.06	0.164	EUSES v2.1.2
Freshwater sediment	mg/kg	7.827	30.4	0.257	EUSES v2.1.2
Marine water sediment	mg/kg	0.761	3.04	0.25	EUSES v2.1.2
Sewage treatment plant	mg/l	10.37	100	0.104	EUSES v2.1.2
Soil	mg/kg	0.197	29.5	0.007	EUSES v2.1.2

1.3.2. Worker exposure Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Storage (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.024 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.097 mg/m³	0	ECETOC TRA worker

1.3.3. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.4. Worker exposure Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.104	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

1.3.5. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.237	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

1.3.6. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.7. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.8. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.9. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.10. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.743 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.065	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.11. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.12. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.13. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.14. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	8.226 mg/kg bw/day	0.044	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.344	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

1.3.15. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.16. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.17. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker

Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.18. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.19. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

1.3.20. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	484 mg/m³	0.4	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.437	
Acute - Local - Inhalation	1940 mg/m³	0.802	ECETOC TRA worker

1.3.21. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.22. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.23. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.24. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.25. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.26. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.27. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.28. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.29. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.368	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.30. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.368	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.31. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.068	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.32. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.343 mg/kg bw/day	0.002	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.052	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.33. Worker exposure Laboratory activities (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.002	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.102	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

1.3.34. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

1.3.35. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.36. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

1.3.37. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker

Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

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

1.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures

1.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

2. AC SE02: Use as an intermediate

2.1. Title section

Use as an intermediate

ES Ref.: AC SE02 ES Type: Worker	Association ref code: IS

Environment		
CS 1	Use as an intermediate	ERC6a
Worker		
	Worker Contributing Scenario	PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Use as an intermediate (ERC6a)

ERC6a	Use of intermediate

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	≤ 33.3 t/d
Annual site tonnage (tons/year):	≤ 10000 t/yr
Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil
Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

2.2.2. Control of worker exposure: Worker Contributing Scenario (PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC28)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC4	Chemical production where opportunity for exposure arises
PROC5	Mixing or blending in batch processes
PROC6	Calendering operations
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10	Roller application or brushing
PROC13	Treatment of articles by dipping and pouring
PROC14	Tabletting, compression, extrusion, pelettisation, granulation
PROC15	Use as laboratory reagent
PROC28	Manual maintenance (cleaning and repair) of machinery

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure Use as an intermediate (ERC6a)

Release route	**Release rate**	**Release estimation method**
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	1 %	ESVOC SPERC 6.1a.v1
Release to waste water from process	333 kg/day	ESVOC SPERC 6.1a.v1
Release fraction to air from process	0.5 %	ESVOC SPERC 6.1a.v1
Release to air from process	166.5 kg/day	ESVOC SPERC 6.1a.v1
Release fraction to soil from process	0.1 %	ESVOC SPERC 6.1a.v1

Protection target	**Unit**	**Exposure estimation**	**PNEC**	**RCR**	**Assessment method**
Freshwater	mg/l	2.822	10.6	0.266	EUSES v2.1.2

Marine water	mg/l	0.277	1.06	0.261	EUSES v2.1.2
Freshwater sediment	mg/kg	12.37	30.4	0.407	EUSES v2.1.2
Marine water sediment	mg/kg	1.216	3.04	0.4	EUSES v2.1.2
Sewage treatment plant	mg/l	20.73	100	0.207	EUSES v2.1.2
Soil	mg/kg	0.331	29.5	0.011	EUSES v2.1.2

2.3.2. Worker exposure Worker Contributing Scenario (PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC28)

Information for contributing exposure scenario
See exposure scenario nr AC SE01

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

2.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures

2.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

3. AC SE03: Use as solvent during synthesis of chemicals, processing not covered otherwise

3.1. Title section

Use as solvent during synthesis of chemicals, processing not covered otherwise

ES Ref.: AC SE03 ES Type: Worker	Association ref code: IS

Environment		
CS 1	Use as solvent during synthesis of chemicals, processing not covered otherwise	ERC4
Worker		
	Worker Contributing Scenario	PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: Use as solvent during synthesis of chemicals, processing not covered otherwise (ERC4)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	≤ 0.8 t/d
Annual site tonnage (tons/year):	≤ 16 t/yr

Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

3.2.2. Control of worker exposure: Worker Contributing Scenario (PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC28)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC4	Chemical production where opportunity for exposure arises
PROC5	Mixing or blending in batch processes
PROC6	Calendering operations
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10	Roller application or brushing
PROC13	Treatment of articles by dipping and pouring
PROC14	Tabletting, compression, extrusion, pelettisation, granulation
PROC15	Use as laboratory reagent
PROC28	Manual maintenance (cleaning and repair) of machinery

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure Use as solvent during synthesis of chemicals, processing not covered otherwise (ERC4)

Release route	Release rate	Release estimation method
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	100 %	ERC
Release to waste water from process	800 kg/day	ERC
Release fraction to air from process	100 %	ERC
Release to air from process	800 kg/day	ERC
Release fraction to soil from process	5 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	5.729	10.6	0.54	EUSES v2.1.2
Marine water	mg/l	0.568	1.06	0.536	EUSES v2.1.2
Freshwater sediment	mg/kg	25.13	30.4	0.827	EUSES v2.1.2
Marine water sediment	mg/kg	2.491	3.04	0.819	EUSES v2.1.2
Sewage treatment plant	mg/l	49.81	100	0.498	EUSES v2.1.2
Soil	mg/kg	0.753	29.5	0.026	EUSES v2.1.2

3.3.2. Worker exposure Worker Contributing Scenario (PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC28)

Information for contributing exposure scenario
See exposure scenario nr AC SE01

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

3.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures

3.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

4. AC SE04: Use in laboratories

4.1. Title section

Use in laboratories

ES Ref.: AC SE04 ES Type: Worker	Association ref code: IS

Environment		
CS 1	Use in laboratories	ERC4
Worker		
CS 2	Roller application or brushing	PROC10
CS 3	Roller application or brushing	PROC10
CS 4	Roller application or brushing	PROC10
CS 5	Roller application or brushing	PROC10
CS 6	Laboratory activities	PROC15
CS 7	Manual activities involving hand contact	PROC19
CS 8	Manual activities involving hand contact	PROC19
CS 9	Manual activities involving hand contact	PROC19
CS 10	Equipment cleaning and maintenance	PROC8a, PROC28
CS 11	Equipment cleaning and maintenance	PROC8a, PROC28
CS 12	Equipment cleaning and maintenance	PROC8a, PROC28
CS 13	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

4.2. Conditions of use affecting exposure

4.2.1. Control of environmental exposure: Use in laboratories (ERC4)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	≤ 0.8 t/d
Annual site tonnage (tons/year):	≤ 16 t/yr
Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil
Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

4.2.2. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
Indoor	
Maximum process temperature	≤ 320 °C

4.2.3. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
Indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

4.2.4. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

4.2.5. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

4.2.6. Control of worker exposure: Laboratory activities (PROC15)

PROC15	Use as laboratory reagent
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
Indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

4.2.7. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

4.2.8. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

4.2.9. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

4.2.10. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

4.2.11. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

4.2.12. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

4.2.13. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

4.3. Exposure estimation and reference to its source

4.3.1. Environmental release and exposure Use in laboratories (ERC4)

Release route	Release rate	Release estimation method
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	100 %	ERC
Release to waste water from process	800 kg/day	ERC
Release fraction to air from process	100 %	ERC
Release to air from process	800 kg/day	ERC
Release fraction to soil	5 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	5.729	10.6	0.54	EUSES v2.1.2
Marine water	mg/l	0.568	1.06	0.536	EUSES v2.1.2
Freshwater sediment	mg/kg	25.13	30.4	0.827	EUSES v2.1.2
Marine water sediment	mg/kg	2.491	3.04	0.819	EUSES v2.1.2
Sewage treatment plant	mg/l	49.81	100	0.498	EUSES v2.1.2
Soil	mg/kg	0.753	29.5	0.026	EUSES v2.1.2

4.3.2. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

4.3.3. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

4.3.4. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

4.3.5. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

4.3.6. Worker exposure Laboratory activities (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.002	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.102	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

4.3.7. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.502	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

4.3.8. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.502	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

4.3.9. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.202	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

4.3.10. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

4.3.11. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

4.3.12. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker

Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

4.3.13. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

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

4.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures

4.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

5. AC SE05: Uses in Coatings

5.1. Title section

Uses in Coatings

ES Ref.: AC SE05
ES Type: Worker

Association ref code: IS

Environment		
CS 1	Uses in Coatings	ERC4
Worker		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Storage	PROC1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 4	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	PROC3
CS 5	Chemical production where opportunity for exposure arises	PROC4
CS 6	Mixing operations (open systems)	PROC5
CS 7	Mixing operations (open systems)	PROC5
CS 8	Mixing operations (open systems)	PROC5
CS 9	Mixing operations (open systems)	PROC5
CS 10	Industrial spraying	PROC7
CS 11	Industrial spraying	PROC7
CS 12	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 13	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 14	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 15	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 16	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 17	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 18	Roller application or brushing	PROC10
CS 19	Roller application or brushing	PROC10
CS 20	Roller application or brushing	PROC10
CS 21	Roller application or brushing	PROC10
CS 22	Treatment of articles by dipping and pouring	PROC13
CS 23	Treatment of articles by dipping and pouring	PROC13
CS 24	Treatment of articles by dipping and pouring	PROC13
CS 25	Treatment of articles by dipping and pouring	PROC13
CS 26	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 27	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 28	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 29	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 30	Laboratory activities	PROC15
CS 31	Manual activities involving hand contact	PROC19
CS 32	Manual activities involving hand contact	PROC19
CS 33	Manual activities involving hand contact	PROC19
CS 34	Equipment cleaning and maintenance	PROC8a, PROC28
CS 35	Equipment cleaning and maintenance	PROC8a, PROC28

CS 36	Equipment cleaning and maintenance	PROC8a, PROC28
CS 37	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

5.2. Conditions of use affecting exposure

5.2.1. Control of environmental exposure: Uses in Coatings (ERC4)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	≤ 40 t/d
Annual site tonnage (tons/year):	≤ 12000 t/yr

Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

5.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

5.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

5.2.4. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Use in closed batch process (synthesis or formulation). With occasional controlled exposure	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

5.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

5.2.6. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.2.7. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

5.2.8. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

5.2.9. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.2.10. Control of worker exposure: Industrial spraying (PROC7)

PROC7	Industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	95 %
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoors,Assumes large workrooms	
Maximum process temperature	≤ 56 °C

5.2.11. Control of worker exposure: Industrial spraying (PROC7)

PROC7	Industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Moderate application rate (0.3 - 3 l/minute)	

Technical and organisational conditions and measures	
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
Indoors,Assumes large workrooms,and/or,Outdoors,close to buildings (< 4 m)	
Maximum process temperature	≤ 56 °C

5.2.12. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.2.13. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

5.2.14. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	

Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.2.15. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.2.16. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

5.2.17. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

5.2.18. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 375 °C

5.2.19. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

5.2.20. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 375 °C

5.2.21. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 375 °C

5.2.22. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.2.23. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.2.24. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

5.2.25. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

5.2.26. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
Indoor,and/or,outdoor	
Maximum process temperature	≤ 320 °C

5.2.27. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

5.2.28. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.2.29. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.2.30. Control of worker exposure: Laboratory activities (PROC15)

PROC15	Use as laboratory reagent

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

5.2.31. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.2.32. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

5.2.33. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.2.34. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

5.2.35. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.2.36. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

5.2.37. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

5.3. Exposure estimation and reference to its source

5.3.1. Environmental release and exposure Uses in Coatings (ERC4)

Release route	Release rate	Release estimation method
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	2 %	ESVOC SPERC 4.3a.v1
Release to waste water from process	800 kg/day	ESVOC SPERC 4.3a.v1
Release fraction to air from process	9.8 %	ESVOC SPERC 4.3a.v1
Release to air from process	3920 kg/day	ESVOC SPERC 4.3a.v1
Release fraction to soil from process	0 %	ESVOC SPERC 4.3a.v1

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	5.729	10.6	0.54	EUSES v2.1.2
Marine water	mg/l	0.568	1.06	0.536	EUSES v2.1.2
Freshwater sediment	mg/kg	25.13	30.4	0.827	EUSES v2.1.2
Marine water sediment	mg/kg	2.491	3.04	0.819	EUSES v2.1.2
Sewage treatment plant	mg/l	49.81	100	0.498	EUSES v2.1.2
Soil	mg/kg	0.859	29.5	0.029	EUSES v2.1.2

5.3.2. Worker exposure Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Storage (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.024 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.097 mg/m³	0	ECETOC TRA worker

5.3.3. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.4. Worker exposure Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.104	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

5.3.5. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.237	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

5.3.6. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.7. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.8. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker

Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.9. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.10. Worker exposure Industrial spraying (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.142 mg/kg bw/day	0.012	ECETOC TRA worker
Inhalation - Long-term - systemic effects	5.5 mg/m³	0.005	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.017	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.11. Worker exposure Industrial spraying (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	8.572 mg/kg bw/day	0.046	ECETOC TRA worker
Inhalation - Long-term - systemic effects	1000 mg/m³	0.826	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.872	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

5.3.12. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.13. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.14. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.15. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.16. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

5.3.17. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	484 mg/m³	0.4	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.437	
Acute - Local - Inhalation	1940 mg/m³	0.802	ECETOC TRA worker

5.3.18. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.19. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.20. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.21. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.22. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.23. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.24. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.25. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.26. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.068	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.27. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.368	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.28. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.343 mg/kg bw/day	0.002	ECETOC TRA worker

Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.052	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.29. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.368	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.30. Worker exposure Laboratory activities (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.002	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.102	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

5.3.31. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.202	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.32. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.502	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.33. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.502	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.34. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

5.3.35. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.36. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

5.3.37. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

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

5.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures

5.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

6. AC SE06: Use as binders and release agents

6.1. Title section

Use as binders and release agents

ES Ref.: AC SE06 ES Type: Worker	Association ref code: IS

Environment		
CS 1	Use as binders and release agents	ERC5
Worker		
CS 2	Use in closed process; Storage	PROC1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 4	Use in closed batch process (synthesis or formulation); With occasional controlled exposure	PROC3
CS 5	Chemical production where opportunity for exposure arises	PROC4
CS 6	Mixing operations (open systems)	PROC5
CS 7	Mixing operations (open systems)	PROC5
CS 8	Mixing operations (open systems)	PROC5
CS 9	Mixing operations (open systems)	PROC5
CS 10	Calendering (including Banburys)	PROC6
CS 11	Calendering (including Banburys)	PROC6
CS 12	Calendering (including Banburys)	PROC6
CS 13	Calendering (including Banburys)	PROC6
CS 14	Industrial spraying	PROC7
CS 15	Industrial spraying	PROC7
CS 16	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 17	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 18	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 19	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 20	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 21	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 22	Roller application or brushing	PROC10
CS 23	Roller application or brushing	PROC10
CS 24	Roller application or brushing	PROC10
CS 25	Roller application or brushing	PROC10
CS 26	Treatment of articles by dipping and pouring	PROC13
CS 27	Treatment of articles by dipping and pouring	PROC13
CS 28	Treatment of articles by dipping and pouring	PROC13
CS 29	Treatment of articles by dipping and pouring	PROC13
CS 30	Equipment cleaning and maintenance	PROC8a, PROC28
CS 31	Equipment cleaning and maintenance	PROC8a, PROC28
CS 32	Equipment cleaning and maintenance	PROC8a, PROC28
CS 33	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

6.2. Conditions of use affecting exposure

6.2.1. Control of environmental exposure: Use as binders and release agents (ERC5)

ERC5	Use at industrial site leading to inclusion into/onto article

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	≤ 1.5 t/d
Annual site tonnage (tons/year):	≤ 30 t/yr

Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

6.2.2. Control of worker exposure: Use in closed process; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

6.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

6.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Use in closed batch process (synthesis or formulation). With occasional controlled exposure	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

6.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

6.2.6. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 %

6.2.7. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.2.8. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.2.9. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

6.2.10. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

6.2.11. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.2.12. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

6.2.13. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.2.14. Control of worker exposure: Industrial spraying (PROC7)

PROC7	Industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	

Technical and organisational conditions and measures	
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
Indoors,Assumes large workrooms,and/or,Outdoors,close to buildings (< 4 m)	
Maximum process temperature	≤ 56 °C

6.2.15. Control of worker exposure: Industrial spraying (PROC7)

PROC7	Industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	

Local exhaust ventilation - efficiency of at least	95 %
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
Indoors,Assumes large workrooms	
Maximum process temperature	≤ 56 °C

6.2.16. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.2.17. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 320 °C

6.2.18. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.2.19. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.2.20. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

6.2.21. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

6.2.22. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.2.23. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

6.2.24. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.2.25. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

6.2.26. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.2.27. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

6.2.28. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.2.29. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

6.2.30. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

6.2.31. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.2.32. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

6.2.33. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

6.3. Exposure estimation and reference to its source

6.3.1. Environmental release and exposure Use as binders and release agents (ERC5)

Release route	Release rate	Release estimation method
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	50 %	ERC
Release to waste water from process	750 kg/day	ERC
Release fraction to air from process	50 %	ERC
Release to air from process	750 kg/day	ERC
Release fraction to soil from process	1 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	5.418	10.6	0.511	EUSES v2.1.2
Marine water	mg/l	0.537	1.06	0.507	EUSES v2.1.2
Freshwater sediment	mg/kg	23.76	30.4	0.782	EUSES v2.1.2
Marine water sediment	mg/kg	2.354	3.04	0.774	EUSES v2.1.2
Sewage treatment plant	mg/l	46.7	100	0.467	EUSES v2.1.2
Soil	mg/kg	0.707	29.5	0.024	EUSES v2.1.2

6.3.2. Worker exposure Use in closed process; Storage (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.024 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.097 mg/m³	0	ECETOC TRA worker

6.3.3. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.4. Worker exposure Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.104	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

6.3.5. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.237	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

6.3.6. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.7. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

6.3.8. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.9. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

6.3.10. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.11. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

6.3.12. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

6.3.13. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.743 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.065	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.14. Worker exposure Industrial spraying (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	8.572 mg/kg bw/day	0.046	ECETOC TRA worker
Inhalation - Long-term - systemic effects	1000 mg/m³	0.826	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.872	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

6.3.15. Worker exposure Industrial spraying (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.143 mg/kg bw/day	0.012	ECETOC TRA worker
Inhalation - Long-term - systemic effects	5.5 mg/m³	0.005	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.017	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.16. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

6.3.17. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.18. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker

Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

6.3.19. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.20. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

6.3.21. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	484 mg/m³	0.4	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.437	
Acute - Local - Inhalation	1940 mg/m³	0.802	ECETOC TRA worker

6.3.22. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.23. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

6.3.24. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

6.3.25. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.26. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

6.3.27. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.28. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.29. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

6.3.30. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

6.3.31. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

6.3.32. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

6.3.33. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

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

6.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures

6.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

7. AC SE07: Use in rubber production and processing

7.1. Title section

Use in rubber production and processing

ES Ref.: AC SE07 ES Type: Worker	Association ref code: IS

Environment		
CS 1	Use in rubber production and processing	ERC6d
Worker		
CS 2	Use in closed process; Storage	PROC1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 4	Use in closed batch process (synthesis or formulation); With occasional controlled exposure	PROC3
CS 5	Chemical production where opportunity for exposure arises	PROC4
CS 6	Mixing operations (open systems)	PROC5
CS 7	Mixing operations (open systems)	PROC5
CS 8	Mixing operations (open systems)	PROC5
CS 9	Mixing operations (open systems)	PROC5
CS 10	Calendering (including Banburys)	PROC6
CS 11	Calendering (including Banburys)	PROC6
CS 12	Calendering (including Banburys)	PROC6
CS 13	Calendering (including Banburys)	PROC6
CS 14	Industrial spraying	PROC7
CS 15	Industrial spraying	PROC7
CS 16	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 17	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 18	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 19	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 20	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 21	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 22	Roller application or brushing	PROC10
CS 23	Roller application or brushing	PROC10
CS 24	Roller application or brushing	PROC10
CS 25	Roller application or brushing	PROC10
CS 26	Treatment of articles by dipping and pouring	PROC13
CS 27	Treatment of articles by dipping and pouring	PROC13
CS 28	Treatment of articles by dipping and pouring	PROC13
CS 29	Treatment of articles by dipping and pouring	PROC13
CS 30	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 31	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 32	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 33	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 34	Equipment cleaning and maintenance	PROC8a, PROC28
CS 35	Equipment cleaning and maintenance	PROC8a, PROC28
CS 36	Equipment cleaning and maintenance	PROC8a, PROC28
CS 37	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

7.2. Conditions of use affecting exposure

7.2.1. Control of environmental exposure: Use in rubber production and processing (ERC6d)

ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	≤ 90 t/d
Annual site tonnage (tons/year):	≤ 27000 t/yr

Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

7.2.2. Control of worker exposure: Use in closed process; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

7.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

7.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

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

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

7.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

7.2.6. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

7.2.7. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.8. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.9. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

7.2.10. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
Indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

7.2.11. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.12. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

7.2.13. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.14. Control of worker exposure: Industrial spraying (PROC7)

PROC7	Industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	95 %
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoors,Assumes large workrooms	
Maximum process temperature	≤ 56 °C

7.2.15. Control of worker exposure: Industrial spraying (PROC7)

PROC7	Industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Moderate application rate (0.3 - 3 l/minute)	

Technical and organisational conditions and measures	
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
Indoors,Assumes large workrooms,and/or,Outdoors,close to buildings (< 4 m)	
Maximum process temperature	≤ 56 °C

7.2.16. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.17. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.18. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

7.2.19. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.20. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

7.2.21. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

7.2.22. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

7.2.23. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoor	
Maximum process temperature	≤ 56 °C

7.2.24. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
Indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

7.2.25. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.26. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.27. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

7.2.28. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

7.2.29. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	

Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 40 °C

7.2.30. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.31. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

7.2.32. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.33. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.34. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

7.2.35. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.2.36. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

7.2.37. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

7.3. Exposure estimation and reference to its source

7.3.1. Environmental release and exposure Use in rubber production and processing (ERC6d)

Release route	Release rate	Release estimation method
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	1 %	ESVOC SPERC 4.19.v1
Release to waste water from process	900 kg/day	ESVOC SPERC 4.19.v1
Release fraction to air from process	1 %	ESVOC SPERC 4.19.v1
Release to air from process	9000 kg/day	ESVOC SPERC 4.19.v1
Release fraction to soil from process	0.01 %	ESVOC SPERC 4.19.v1

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	6.352	10.6	0.599	EUSES v2.1.2
Marine water	mg/l	0.63	1.06	0.594	EUSES v2.1.2
Freshwater sediment	mg/kg	27.86	30.4	0.916	EUSES v2.1.2
Marine water sediment	mg/kg	2.764	3.04	0.909	EUSES v2.1.2
Sewage treatment plant	mg/l	56.04	100	0.56	EUSES v2.1.2
Soil	mg/kg	0.867	29.5	0.029	EUSES v2.1.2

7.3.2. Worker exposure Use in closed process; Storage (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.024 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.097 mg/m³	0	ECETOC TRA worker

7.3.3. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.4. Worker exposure Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.104	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

7.3.5. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.237	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

7.3.6. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.7. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.8. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.9. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.10. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker

Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.11. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.12. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.13. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.743 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.065	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.14. Worker exposure Industrial spraying (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.143 mg/kg bw/day	0.012	ECETOC TRA worker
Inhalation - Long-term - systemic effects	5.5 mg/m³	0.005	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.017	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.15. Worker exposure Industrial spraying (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	8.572 mg/kg bw/day	0.046	ECETOC TRA worker
Inhalation - Long-term - systemic effects	1000 mg/m³	0.826	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.872	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

7.3.16. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.17. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.18. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.19. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.20. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

7.3.21. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	484 mg/m³	0.4	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.437	
Acute - Local - Inhalation	1940 mg/m³	0.802	ECETOC TRA worker

7.3.22. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.23. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.24. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.25. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.26. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.27. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.28. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.29. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.30. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker

Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.368	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.31. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.068	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.32. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.368	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.33. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.343 mg/kg bw/day	0.002	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.052	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.34. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

7.3.35. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.36. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

7.3.37. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

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

7.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures

7.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

8. AC SE08: Polymer manufacturing

8.1. Title section

Polymer manufacturing

ES Ref.: AC SE08
ES Type: Worker

Association ref code: IS

Environment		
CS 1	Polymer manufacturing	ERC6d
Worker		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	PROC1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 4	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	PROC3
CS 5	Chemical production where opportunity for exposure arises	PROC4
CS 6	Mixing operations (open systems)	PROC5
CS 7	Mixing operations (open systems)	PROC5
CS 8	Mixing operations (open systems)	PROC5
CS 9	Mixing operations (open systems)	PROC5
CS 10	Calendering (including Banburys)	PROC6
CS 11	Calendering (including Banburys)	PROC6
CS 12	Calendering (including Banburys)	PROC6
CS 13	Calendering (including Banburys)	PROC6
CS 14	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 15	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 16	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 17	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 18	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 19	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 20	Roller application or brushing	PROC10
CS 21	Roller application or brushing	PROC10
CS 22	Roller application or brushing	PROC10
CS 23	Roller application or brushing	PROC10
CS 24	Treatment of articles by dipping and pouring	PROC13
CS 25	Treatment of articles by dipping and pouring	PROC13
CS 26	Treatment of articles by dipping and pouring	PROC13
CS 27	Treatment of articles by dipping and pouring	PROC13
CS 28	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 29	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 30	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 31	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 32	Laboratory activities	PROC15
CS 33	Equipment cleaning and maintenance	PROC8a, PROC28
CS 34	Equipment cleaning and maintenance	PROC8a, PROC28
CS 35	Equipment cleaning and maintenance	PROC8a, PROC28

CS 36	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

8.2. Conditions of use affecting exposure

8.2.1. Control of environmental exposure: Polymer manufacturing (ERC6d)

ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	≤ 90 t/d
Annual site tonnage (tons/year):	≤ 27000 t/yr

Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

8.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

8.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

8.2.4. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Use in closed batch process (synthesis or formulation). With occasional controlled exposure	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

8.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

8.2.6. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
Indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

8.2.7. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.8. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.9. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

8.2.10. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

8.2.11. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.12. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

8.2.13. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.14. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.15. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.16. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.17. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 320 °C

8.2.18. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

8.2.19. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

8.2.20. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

8.2.21. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoor	
Maximum process temperature	≤ 56 °C

8.2.22. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
Indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

8.2.23. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.24. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.25. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

8.2.26. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

8.2.27. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 40 °C

8.2.28. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.29. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

8.2.30. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.31. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.32. Control of worker exposure: Laboratory activities (PROC15)

PROC15	Use as laboratory reagent

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

8.2.33. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid

Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

8.2.34. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.2.35. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

8.2.36. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

8.3. Exposure estimation and reference to its source

8.3.1. Environmental release and exposure Polymer manufacturing (ERC6d)

Release route	Release rate	Release estimation method
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	1 %	ESVOC SPERC 4.20.v1
Release to waste water from process	900 kg/day	ESVOC SPERC 4.20.v1
Release fraction to air from process	0.2 %	ESVOC SPERC 4.20.v1
Release to air from process	180 kg/day	ESVOC SPERC 4.20.v1
Release fraction to soil from process	0.01 %	ESVOC SPERC 4.20.v1

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	6.352	10.6	0.599	EUSES v2.1.2
Marine water	mg/l	0.63	1.06	0.594	EUSES v2.1.2
Freshwater sediment	mg/kg	27.86	30.4	0.916	EUSES v2.1.2
Marine water sediment	mg/kg	2.764	3.04	0.909	EUSES v2.1.2
Sewage treatment plant	mg/l	56.04	100	0.56	EUSES v2.1.2
Soil	mg/kg	0.847	29.5	0.029	EUSES v2.1.2

8.3.2. Worker exposure Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.024 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.097 mg/m³	0	ECETOC TRA worker

8.3.3. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.4. Worker exposure Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.104	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

8.3.5. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.237	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

8.3.6. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.7. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.8. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.9. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.10. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.11. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.12. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker

Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.13. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.743 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.065	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.14. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.15. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.16. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.17. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.18. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

8.3.19. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	484 mg/m³	0.4	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.437	
Acute - Local - Inhalation	1940 mg/m³	0.802	ECETOC TRA worker

8.3.20. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.21. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.22. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.23. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.24. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.25. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.26. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.27. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.28. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.368	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.29. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.068	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.30. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.368	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.31. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.343 mg/kg bw/day	0.002	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.052	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.32. Worker exposure Laboratory activities (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.002	ECETOC TRA worker

Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.102	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

8.3.33. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

8.3.34. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.35. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

8.3.36. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

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

8.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures

8.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

9. AC SE09: Use in polymer processing

9.1. Title section

Use in polymer processing

ES Ref.: AC SE09 ES Type: Worker	Association ref code: IS

Environment		
CS 1	Use in polymer processing	ERC6d
Worker		
	Worker Contributing Scenario	PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

9.2. Conditions of use affecting exposure

9.2.1. Control of environmental exposure: Use in polymer processing (ERC6d)

ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	≤ 109.2 t/d
Annual site tonnage (tons/year):	≤ 32760 t/yr

Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

9.2.2. Control of worker exposure: Worker Contributing Scenario (PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC28)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC4	Chemical production where opportunity for exposure arises
PROC5	Mixing or blending in batch processes
PROC6	Calendering operations
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10	Roller application or brushing
PROC13	Treatment of articles by dipping and pouring
PROC14	Tabletting, compression, extrusion, pelettisation, granulation
PROC15	Use as laboratory reagent
PROC28	Manual maintenance (cleaning and repair) of machinery

9.3. Exposure estimation and reference to its source

9.3.1. Environmental release and exposure Use in polymer processing (ERC6d)

Release route	**Release rate**	**Release estimation method**
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	0 %	ESVOC SPERC 4.21a.v1
Release to waste water from process	0 kg/day	ESVOC SPERC 4.21a.v1
Release fraction to air from process	15 %	ESVOC SPERC 4.21a.v1
Release to air from process	16400 kg/day	ESVOC SPERC 4.21a.v1
Release fraction to soil from process	0.001 %	ESVOC SPERC 4.21a.v1

Protection target	**Unit**	**Exposure estimation**	**PNEC**	**RCR**	**Assessment method**
Freshwater	mg/l	0.748	10.6	0.071	EUSES v2.1.2

Marine water	mg/l	0.07	1.06	0.066	EUSES v2.1.2
Freshwater sediment	mg/kg	3.281	30.4	0.108	EUSES v2.1.2
Marine water sediment	mg/kg	0.306	3.04	0.101	EUSES v2.1.2
Sewage treatment plant	mg/l	0	100	0	EUSES v2.1.2
Soil	mg/kg	0.472	29.5	0.016	EUSES v2.1.2

9.3.2. Worker exposure Worker Contributing Scenario (PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC28)

Information for contributing exposure scenario
See exposure scenario nr AC SE08

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

9.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures

9.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

10. AC SE10: Use in Cleaning Agents

10.1. Title section

Use in Cleaning Agents

ES Ref.: AC SE10 ES Type: Worker	Association ref code: IS

Environment		
CS 1	Use in Cleaning Agents	ERC4
Worker		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	PROC1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 4	Use in closed batch process (synthesis or formulation); With occasional controlled exposure	PROC3
CS 5	Chemical production where opportunity for exposure arises	PROC4
CS 6	Mixing operations (open systems)	PROC5
CS 7	Mixing operations (open systems)	PROC5
CS 8	Mixing operations (open systems)	PROC5
CS 9	Mixing operations (open systems)	PROC5
CS 10	Industrial spraying	PROC7
CS 11	Industrial spraying	PROC7
CS 12	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 13	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 14	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 15	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 16	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 17	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 18	Roller application or brushing	PROC10
CS 19	Roller application or brushing	PROC10
CS 20	Roller application or brushing	PROC10
CS 21	Roller application or brushing	PROC10
CS 22	Treatment of articles by dipping and pouring	PROC13
CS 23	Treatment of articles by dipping and pouring	PROC13
CS 24	Treatment of articles by dipping and pouring	PROC13
CS 25	Treatment of articles by dipping and pouring	PROC13
CS 26	Laboratory activities	PROC15
CS 27	Manual activities involving hand contact	PROC19
CS 28	Manual activities involving hand contact	PROC19
CS 29	Manual activities involving hand contact	PROC19
CS 30	Equipment cleaning and maintenance	PROC8a, PROC28
CS 31	Equipment cleaning and maintenance	PROC8a, PROC28
CS 32	Equipment cleaning and maintenance	PROC8a, PROC28
CS 33	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

10.2. Conditions of use affecting exposure

10.2.1. Control of environmental exposure: Use in Cleaning Agents (ERC4)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Amount used, frequency and duration of use (or from service life)

Daily amount per site	≤ 109.2 t/d

Annual site tonnage (tons/year):	≤ 32760 t/yr
Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil
Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

10.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 60 °C

10.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 60 °C

10.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Use in closed batch process (synthesis or formulation). With occasional controlled exposure	
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 60 °C

10.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 60 °C

10.2.6. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 60 °C

10.2.7. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

10.2.8. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	

Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

10.2.9. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

10.2.10. Control of worker exposure: Industrial spraying (PROC7)

PROC7	Industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	
Technical and organisational conditions and measures	
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)
Other conditions affecting workers exposure	
Indoors,Assumes large workrooms,and/or,Outdoors,close to buildings (< 4 m)	
Maximum process temperature	≤ 60 °C

10.2.11. Control of worker exposure: Industrial spraying (PROC7)

PROC7	Industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	95 %
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoors,Assumes large workrooms	
Maximum process temperature	≤ 60 °C

10.2.12. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

10.2.13. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

10.2.14. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

10.2.15. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

10.2.16. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 60 °C

10.2.17. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 60 °C

10.2.18. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

10.2.19. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoor	
Maximum process temperature	≤ 60 °C

10.2.20. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
Indoor,and/or,outdoor	
Maximum process temperature	≤ 60 °C

10.2.21. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

10.2.22. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

10.2.23. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 60 °C

10.2.24. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 60 °C

10.2.25. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

10.2.26. Control of worker exposure: Laboratory activities (PROC15)

PROC15	Use as laboratory reagent
Product (article) characteristics	
Physical form of product	Liquid

Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 60 °C

10.2.27. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 60 °C

10.2.28. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

10.2.29. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

10.2.30. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

10.2.31. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 60 °C

10.2.32. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	

Maximum process temperature	≤ 60 °C

10.2.33. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

10.3. Exposure estimation and reference to its source

10.3.1. Environmental release and exposure Use in Cleaning Agents (ERC4)

Release route	Release rate	Release estimation method
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	0.01 %	ESVOC SPERC 4.4a.v1
Release to waste water from process	10.92 kg/day	ESVOC SPERC 4.4a.v1
Release fraction to air from process	30 %	ESVOC SPERC 4.4a.v1
Release to air from process	32800 kg/day	ESVOC SPERC 4.4a.v1
Release fraction to soil from process	0 %	ESVOC SPERC 4.4a.v1

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.816	10.6	0.077	EUSES v2.1.2
Marine water	mg/l	0.077	1.06	0.073	EUSES v2.1.2
Freshwater sediment	mg/kg	3.579	30.4	0.118	EUSES v2.1.2
Marine water sediment	mg/kg	0.336	3.04	0.111	EUSES v2.1.2
Sewage treatment plant	mg/l	0.68	100	0.007	EUSES v2.1.2
Soil	mg/kg	0.931	29.5	0.032	EUSES v2.1.2

10.3.2. Worker exposure Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.024 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.097 mg/m³	0	ECETOC TRA worker

10.3.3. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.3.4. Worker exposure Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.104	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

10.3.5. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.237	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

10.3.6. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.3.7. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

10.3.8. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.3.9. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

10.3.10. Worker exposure Industrial spraying (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	8.572 mg/kg bw/day	0.046	ECETOC TRA worker
Inhalation - Long-term - systemic effects	1000 mg/m³	0.826	Used ART model (v1.5)

Sum RCR - Long-term - systemic effects		0.872	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

10.3.11. Worker exposure Industrial spraying (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.143 mg/kg bw/day	0.012	ECETOC TRA worker
Inhalation - Long-term - systemic effects	5.5 mg/m³	0.005	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.017	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.3.12. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

10.3.13. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

10.3.14. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.3.15. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.3.16. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

10.3.17. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker

Inhalation - Long-term - systemic effects	484 mg/m³	0.4	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.437	
Acute - Local - Inhalation	1940 mg/m³	0.802	ECETOC TRA worker

10.3.18. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

10.3.19. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.497	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

10.3.20. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.3.21. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.197	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.3.22. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

10.3.23. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.3.24. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

10.3.25. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.3.26. Worker exposure Laboratory activities (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.002	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.102	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

10.3.27. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.502	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

10.3.28. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.202	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.3.29. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

10.3.30. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

10.3.31. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.3.32. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

10.3.33. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

10.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

10.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.

10.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

11. AC SE11: Oil field well drilling and production operations

11.1. Title section

Oil field well drilling and production operations

ES Ref.: AC SE11 ES Type: Worker	Association ref code: IS

Environment		
CS 1	Oil field well drilling and production operations	ERC4
Worker		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	PROC1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 4	Use in closed batch process (synthesis or formulation); With occasional controlled exposure	PROC3
CS 5	Use in batch and other process (synthesis) where opportunity for exposure arises	PROC4
CS 6	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 7	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 8	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 9	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 10	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 11	Equipment cleaning and maintenance	PROC8a, PROC28
CS 12	Equipment cleaning and maintenance	PROC8a, PROC28
CS 13	Equipment cleaning and maintenance	PROC8a, PROC28
CS 14	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

11.2. Conditions of use affecting exposure

11.2.1. Control of environmental exposure: Oil field well drilling and production operations (ERC4)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	≤ 109.2 t/d
Annual site tonnage (tons/year):	≤ 32760 t/yr
Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil
Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

11.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

11.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

11.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Use in closed batch process (synthesis or formulation). With occasional controlled exposure	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

11.2.5. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

11.2.6. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

11.2.7. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

11.2.8. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

11.2.9. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

11.2.10. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

11.2.11. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

11.2.12. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

11.2.13. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

11.2.14. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

11.3. Exposure estimation and reference to its source

11.3.1. Environmental release and exposure Oil field well drilling and production operations (ERC4)

Release route	Release rate	Release estimation method
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	0.01 %	ESVOC SPERC 4.5a.v1
Release to waste water from process	10.92 kg/day	ESVOC SPERC 4.5a.v1
Release fraction to air from process	30 %	ESVOC SPERC 4.5a.v1
Release to air from process	32800 kg/day	ESVOC SPERC 4.5a.v1
Release fraction to soil from process	0 %	ESVOC SPERC 4.5a.v1

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.816	10.6	0.077	EUSES v2.1.2
Marine water	mg/l	0.077	1.06	0.073	EUSES v2.1.2
Freshwater sediment	mg/kg	3.579	30.4	0.118	EUSES v2.1.2
Marine water sediment	mg/kg	0.336	3.04	0.111	EUSES v2.1.2
Sewage treatment plant	mg/l	0.68	100	0.007	EUSES v2.1.2
Soil	mg/kg	0.931	29.5	0.032	EUSES v2.1.2

11.3.2. Worker exposure Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.024 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.097 mg/m³	0	ECETOC TRA worker

11.3.3. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

11.3.4. Worker exposure Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.104	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

11.3.5. Worker exposure Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.237	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

11.3.6. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

11.3.7. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

11.3.8. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

11.3.9. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

11.3.10. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

11.3.11. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

11.3.12. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

11.3.13. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

11.3.14. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

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

11.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures

11.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

12. AC SE12: Blowing agent

12.1. Title section

Blowing agent

ES Ref.: AC SE12 ES Type: Worker	Association ref code: IS

Environment		
CS 1	Use in blowing agents	ERC4
Worker		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	PROC1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 4	Use in closed batch process (synthesis or formulation); With occasional controlled exposure	PROC3
CS 5	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 6	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 7	Use as a blowing agent	PROC12
CS 8	Equipment cleaning and maintenance	PROC8a, PROC28
CS 9	Equipment cleaning and maintenance	PROC8a, PROC28
CS 10	Equipment cleaning and maintenance	PROC8a, PROC28
CS 11	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

12.2. Conditions of use affecting exposure

12.2.1. Control of environmental exposure: Use in blowing agents (ERC4)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	≤ 109.2 t/d
Annual site tonnage (tons/year):	≤ 32760 t/yr
Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil
Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

12.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

12.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

12.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Use in closed batch process (synthesis or formulation). With occasional controlled exposure	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

12.2.5. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

12.2.6. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

12.2.7. Control of worker exposure: Use as a blowing agent (PROC12)

PROC12	Use of blowing agents in manufacture of foam

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

12.2.8. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

12.2.9. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

12.2.10. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

12.2.11. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

12.3. Exposure estimation and reference to its source

12.3.1. Environmental release and exposure Use in blowing agents (ERC4)

Release route	**Release rate**	**Release estimation method**
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	0.1 %	ESVOC SPERC 4.9.v1
Release to waste water from process	109.2 kg/day	ESVOC SPERC 4.9.v1
Release fraction to air from process	100 %	ESVOC SPERC 4.9.v1
Release to air from process	109000 kg/day	ESVOC SPERC 4.9.v1
Release fraction to soil from process	0 %	ESVOC SPERC 4.9.v1

Protection target	**Unit**	**Exposure estimation**	**PNEC**	**RCR**	**Assessment method**
Freshwater	mg/l	1.428	10.6	0.135	EUSES v2.1.2
Marine water	mg/l	0.138	1.06	0.13	EUSES v2.1.2
Freshwater sediment	mg/kg	6.263	30.4	0.206	EUSES v2.1.2
Marine water sediment	mg/kg	0.605	3.04	0.199	EUSES v2.1.2
Sewage treatment plant	mg/l	6.799	100	0.068	EUSES v2.1.2
Soil	mg/kg	3.118	29.5	0.106	EUSES v2.1.2

12.3.2. Worker exposure Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.024 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.097 mg/m³	0	ECETOC TRA worker

12.3.3. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

12.3.4. Worker exposure Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.104	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

12.3.5. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

12.3.6. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	484 mg/m³	0.4	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.437	
Acute - Local - Inhalation	1940 mg/m³	0.802	ECETOC TRA worker

12.3.7. Worker exposure Use as a blowing agent (PROC12)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.002	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.202	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

12.3.8. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

12.3.9. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

12.3.10. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

12.3.11. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

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

12.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures

12.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

13. AC SE13: Use in mining chemicals

13.1. Title section

Use in mining chemicals

ES Ref.: AC SE13 ES Type: Worker	Association ref code: IS

Environment		
CS 1	Use in mining chemicals	ERC4
Worker		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	PROC1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 4	Use in closed batch process (synthesis or formulation); With occasional controlled exposure	PROC3
CS 5	Use in batch and other process (synthesis) where opportunity for exposure arises	PROC4
CS 6	Mixing operations (open systems)	PROC5
CS 7	Mixing operations (open systems)	PROC5
CS 8	Mixing operations (open systems)	PROC5
CS 9	Mixing operations (open systems)	PROC5
CS 10	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 11	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 12	Equipment cleaning and maintenance	PROC8a, PROC28
CS 13	Equipment cleaning and maintenance	PROC8a, PROC28
CS 14	Equipment cleaning and maintenance	PROC8a, PROC28
CS 15	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Use at industrial sites (IS)

13.2. Conditions of use affecting exposure

13.2.1. Control of environmental exposure: Use in mining chemicals (ERC4)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	≤ 2 t/d
Annual site tonnage (tons/year):	≤ 600 t/yr

Conditions and measures related to sewage treatment plant	
Assumed domestic sewage treatment plant flow	≥ 2000 m³/d
Sludge treatment technique :	Controlled application to agricultural soil

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

13.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

13.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

13.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Use in closed batch process (synthesis or formulation). With occasional controlled exposure	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

13.2.5. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

13.2.6. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

13.2.7. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

13.2.8. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

13.2.9. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 320 °C

13.2.10. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

13.2.11. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

13.2.12. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

13.2.13. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

13.2.14. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

13.2.15. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

13.3. Exposure estimation and reference to its source

13.3.1. Environmental release and exposure Use in mining chemicals (ERC4)

Release route	Release rate	Release estimation method
Receiving surface water flow is 18000 m³/d		
Release fraction to wastewater	50 %	ESVOC SPERC 4.23.v1
Release to waste water from process	1000 kg/day	ESVOC SPERC 4.23.v1
Release fraction to air from process	5 %	ESVOC SPERC 4.23.v1
Release to air from process	100 kg/day	ESVOC SPERC 4.23.v1
Release fraction to soil from process	5 %	ESVOC SPERC 4.23.v1

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	6.445	10.6	0.608	EUSES v2.1.2
Marine water	mg/l	0.64	1.06	0.604	EUSES v2.1.2
Freshwater sediment	mg/kg	28.27	30.4	0.93	EUSES v2.1.2
Marine water sediment	mg/kg	2.805	3.04	0.923	EUSES v2.1.2
Sewage treatment plant	mg/l	56.97	100	0.57	EUSES v2.1.2

Soil	mg/kg	0.859	29.5	0.029	EUSES v2.1.2

13.3.2. Worker exposure Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.024 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.097 mg/m³	0	ECETOC TRA worker

13.3.3. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

13.3.4. Worker exposure Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.104	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

13.3.5. Worker exposure Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.237	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

13.3.6. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

13.3.7. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

13.3.8. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker

Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

13.3.9. Worker exposure Mixing operations (open systems) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

13.3.10. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

13.3.11. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	484 mg/m³	0.4	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.437	
Acute - Local - Inhalation	1940 mg/m³	0.802	ECETOC TRA worker

13.3.12. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.124	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

13.3.13. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

13.3.14. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

13.3.15. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.371 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.057	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

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

13.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.

13.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

14. AC SE14: Use in laboratories

14.1. Title section

Use in laboratories

ES Ref.: AC SE14 ES Type: Worker	Association ref code: PW

Environment		
CS 1	Use in laboratories	ERC8a
Worker		
CS 2	Roller application or brushing	PROC10
CS 3	Roller application or brushing	PROC10
CS 4	Roller application or brushing	PROC10
CS 5	Use as laboratory reagent	PROC15
CS 6	Manual activities involving hand contact	PROC19
CS 7	Manual activities involving hand contact	PROC19
CS 8	Manual activities involving hand contact	PROC19
CS 9	Equipment cleaning and maintenance	PROC8a, PROC28
CS 10	Equipment cleaning and maintenance	PROC8a, PROC28
CS 11	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Widespread use by professional workers (PW)

14.2. Conditions of use affecting exposure

14.2.1. Control of environmental exposure: Use in laboratories (ERC8a)

ERC8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d
Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	
Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

14.2.2. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

14.2.3. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

14.2.4. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

14.2.5. Control of worker exposure: Use as laboratory reagent (PROC15)

PROC15	Use as laboratory reagent

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

14.2.6. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

14.2.7. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

14.2.8. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

14.2.9. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

14.2.10. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 320 °C

14.2.11. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 320 °C

14.3. Exposure estimation and reference to its source

14.3.1. Environmental release and exposure Use in laboratories (ERC8a)

Release route	Release rate	Release estimation method
Release fraction to wastewater	100 %	ERC
Release to waste water from process	21.32 kg/day	ERC
Release fraction to air from process	100 %	ERC
Release fraction to soil from process	0 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.881	10.6	0.083	EUSES v2.1.2
Marine water	mg/l	0.083	1.06	0.078	EUSES v2.1.2
Freshwater sediment	mg/kg	3.863	30.4	0.127	EUSES v2.1.2
Marine water sediment	mg/kg	0.365	3.04	0.12	EUSES v2.1.2
Sewage treatment plant	mg/l	1.327	100	0.013	EUSES v2.1.2
Soil	mg/kg	0.042	29.5	0.001	EUSES v2.1.2

14.3.2. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.447	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

14.3.3. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker

Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.247	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

14.3.4. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.347	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

14.3.5. Worker exposure Use as laboratory reagent (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.002	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.102	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

14.3.6. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.452	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

14.3.7. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.352	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

14.3.8. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	141.4 mg/kg bw/day	0.76	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.86	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

14.3.9. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

14.3.10. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

14.3.11. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

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

14.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.

14.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

15. AC SE15: Uses in Coatings

15.1. Title section

Uses in Coatings

ES Ref.: AC SE15
ES Type: Worker

Association ref code: PW

Environment		
CS 1	Uses in Coatings	ERC8a, ERC8d
CS 2	Uses in Coatings	ERC8c, ERC8f
Worker		
CS 3	Use in closed process; Storage	PROC1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 5	Use in closed batch process (synthesis or formulation); With occasional controlled exposure	PROC3
CS 6	Chemical production where opportunity for exposure arises	PROC4
CS 7	Chemical production where opportunity for exposure arises	PROC4
CS 8	Chemical production where opportunity for exposure arises	PROC4
CS 9	Mixing or blending in batch processes	PROC5
CS 10	Mixing or blending in batch processes	PROC5
CS 11	Mixing or blending in batch processes	PROC5
CS 12	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 13	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 14	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 15	Use as laboratory reagent	PROC8b
CS 16	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 17	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 18	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 19	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 20	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 21	Roller application or brushing	PROC10
CS 22	Roller application or brushing	PROC10
CS 23	Roller application or brushing	PROC10
CS 24	Spraying	PROC11
CS 25	Spraying	PROC11
CS 26	Treatment of articles by dipping and pouring	PROC13
CS 27	Treatment of articles by dipping and pouring	PROC13
CS 28	Treatment of articles by dipping and pouring	PROC13
CS 29	Laboratory activities	PROC15
CS 30	Manual activities involving hand contact	PROC19
CS 31	Manual activities involving hand contact	PROC19
CS 32	Manual activities involving hand contact	PROC19
CS 33	Equipment cleaning and maintenance	PROC8a, PROC28
CS 34	Equipment cleaning and maintenance	PROC8a, PROC28
CS 35	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Widespread use by professional workers (PW)

15.2. Conditions of use affecting exposure

15.2.1. Control of environmental exposure: Uses in Coatings (ERC8a, ERC8d)

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

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d

Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

15.2.2. Control of environmental exposure: Uses in Coatings (ERC8c, ERC8f)

ERC8c	Widespread use leading to inclusion into/onto article (indoor)
ERC8f	Widespread use leading to inclusion into/onto article (outdoor)

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d

Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

15.2.3. Control of worker exposure: Use in closed process; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

15.2.4. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

15.2.5. Control of worker exposure: Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Use in closed batch process (synthesis or formulation). With occasional controlled exposure	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

15.2.6. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

15.2.7. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.8. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	

Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.9. Control of worker exposure: Mixing or blending in batch processes (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

15.2.10. Control of worker exposure: Mixing or blending in batch processes (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.11. Control of worker exposure: Mixing or blending in batch processes (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.12. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

15.2.13. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.14. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.15. Control of worker exposure: Use as laboratory reagent (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.16. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

15.2.17. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 % Inhalation
Local exhaust ventilation - efficiency of at least	80 % Dermal
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.18. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

15.2.19. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.20. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.21. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 375 °C

15.2.22. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 375 °C

15.2.23. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 375 °C

15.2.24. Control of worker exposure: Spraying (PROC11)

PROC11	Non industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
Indoors,Assumes large workrooms	
Maximum process temperature	≤ 56 °C

15.2.25. Control of worker exposure: Spraying (PROC11)

PROC11	Non industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Surface spraying of liquids. Moderate application rate (0.3 - 3 l/minute). Ensure that direction of application is only horizontal or downward. Spraying with no or low compressed air use	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)
Other conditions affecting workers exposure	
Indoors,Assumes large workrooms,and/or,Outdoors,close to buildings (< 4 m)	
Maximum process temperature	≤ 56 °C

15.2.26. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.27. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.28. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

15.2.29. Control of worker exposure: Laboratory activities (PROC15)

PROC15	Use as laboratory reagent

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

15.2.30. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.31. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.32. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

15.2.33. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.2.34. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

15.2.35. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

15.3. Exposure estimation and reference to its source

15.3.1. Environmental release and exposure Uses in Coatings (ERC8a, ERC8d)

Release route	Release rate	Release estimation method
Release fraction to wastewater	100 %	ERC
Release to waste water from process	21.32 kg/day	ERC
Release fraction to air from process	100 %	ERC
Release fraction to soil from process	20 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.881	10.6	0.083	EUSES v2.1.2
Marine water	mg/l	0.083	1.06	0.078	EUSES v2.1.2
Freshwater sediment	mg/kg	3.863	30.4	0.127	EUSES v2.1.2
Marine water sediment	mg/kg	0.365	3.04	0.12	EUSES v2.1.2
Sewage treatment plant	mg/l	1.327	100	0.013	EUSES v2.1.2
Soil	mg/kg	0.042	29.5	0.001	EUSES v2.1.2

15.3.2. Environmental release and exposure Uses in Coatings (ERC8c, ERC8f)

Release route	Release rate	Release estimation method
Release fraction to wastewater	30 %	Worst case assumption
Release to waste water from process	6.395 kg/day	Worst case assumption
Release fraction to air from process	15 %	ERC
Release fraction to soil from process	0.5 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.788	10.6	0.074	EUSES v2.1.2
Marine water	mg/l	0.074	1.06	0.07	EUSES v2.1.2
Freshwater sediment	mg/kg	3.455	30.4	0.114	EUSES v2.1.2
Marine water sediment	mg/kg	0.324	3.04	0.107	EUSES v2.1.2
Sewage treatment plant	mg/l	0.398	100	0.004	EUSES v2.1.2
Soil	mg/kg	0.029	29.5	0.001	EUSES v2.1.2

15.3.3. Worker exposure Use in closed process; Storage (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.242 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.968 mg/m³	0	ECETOC TRA worker

15.3.4. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

15.3.5. Worker exposure Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.204	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

15.3.6. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

15.3.7. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

15.3.8. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.137	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

15.3.9. Worker exposure Mixing or blending in batch processes (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.115	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

15.3.10. Worker exposure Mixing or blending in batch processes (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

15.3.11. Worker exposure Mixing or blending in batch processes (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

15.3.12. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

15.3.13. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

15.3.14. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

15.3.15. Worker exposure Use as laboratory reagent (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

15.3.16. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

15.3.17. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.065	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

15.3.18. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

15.3.19. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker

Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

15.3.20. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.372 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

15.3.21. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.447	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

15.3.22. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.347	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

15.3.23. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.247	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

15.3.24. Worker exposure Spraying (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	107.1 mg/kg bw/day	0.576	ECETOC TRA worker
Inhalation - Long-term - systemic effects	5.5 mg/m³	0.005	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.581	
Acute - Local - Inhalation	1940 mg/m³	0.802	ECETOC TRA worker

15.3.25. Worker exposure Spraying (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	21.43 mg/kg bw/day	0.115	ECETOC TRA worker
Inhalation - Long-term - systemic effects	1000 mg/m³	0.826	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.941	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

15.3.26. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

15.3.27. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.115	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

15.3.28. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

15.3.29. Worker exposure Laboratory activities (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.002	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.102	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

15.3.30. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.352	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

15.3.31. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.452	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

15.3.32. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	141.4 mg/kg bw/day	0.76	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.86	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

15.3.33. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

15.3.34. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

15.3.35. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

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

15.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.

15.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for consumers

16. AC SE16: Use as binders and release agents

16.1. Title section

Use as binders and release agents

ES Ref.: AC SE16 ES Type: Worker	Association ref code: PW

Environment		
CS 1	Use as binders and release agents	ERC8a, ERC8d
CS 2	Use as binders and release agents	ERC8b, ERC8e
CS 3	Use as binders and release agents	ERC8c, ERC8f
Worker		
CS 4	Use in closed process; Storage	PROC1
CS 5	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 6	Use in closed batch process (synthesis or formulation); With occasional controlled exposure	PROC3
CS 7	Chemical production where opportunity for exposure arises	PROC4
CS 8	Chemical production where opportunity for exposure arises	PROC4
CS 9	Chemical production where opportunity for exposure arises	PROC4
CS 10	Mixing or blending in batch processes	PROC5
CS 11	Mixing or blending in batch processes	PROC5
CS 12	Mixing or blending in batch processes	PROC5
CS 13	Calendering (including Banburys)	PROC6
CS 14	Calendering (including Banburys)	PROC6
CS 15	Calendering (including Banburys)	PROC6
CS 16	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 17	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 18	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 19	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 20	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 21	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 22	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 23	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 24	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 25	Roller application or brushing	PROC10
CS 26	Roller application or brushing	PROC10
CS 27	Roller application or brushing	PROC10
CS 28	Spraying	PROC11
CS 29	Spraying	PROC11
CS 30	Equipment cleaning and maintenance	PROC8a, PROC28
CS 31	Equipment cleaning and maintenance	PROC8a, PROC28
CS 32	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Widespread use by professional workers (PW)

16.2. Conditions of use affecting exposure

16.2.1. Control of environmental exposure: Use as binders and release agents (ERC8a, ERC8d)

ERC8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)

ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d

Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

16.2.2. Control of environmental exposure: Use as binders and release agents (ERC8b, ERC8e)

ERC8b	Widespread use of reactive processing aid (no inclusion into or onto article, indoor)
ERC8e	Widespread use of reactive processing aid (no inclusion into or onto article, outdoor)

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d

Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

16.2.3. Control of environmental exposure: Use as binders and release agents (ERC8c, ERC8f)

ERC8c	Widespread use leading to inclusion into/onto article (indoor)
ERC8f	Widespread use leading to inclusion into/onto article (outdoor)

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d

Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

16.2.4. Control of worker exposure: Use in closed process; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

16.2.5. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

16.2.6. Control of worker exposure: Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Use in closed batch process (synthesis or formulation). With occasional controlled exposure	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

16.2.7. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

16.2.8. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.9. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.10. Control of worker exposure: Mixing or blending in batch processes (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

16.2.11. Control of worker exposure: Mixing or blending in batch processes (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.12. Control of worker exposure: Mixing or blending in batch processes (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.13. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Local exhaust ventilation - efficiency of at least	80
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

16.2.14. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.15. Control of worker exposure: Calendering (including Banburys) (PROC6)

PROC6	Calendering operations

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.16. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

16.2.17. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.18. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.19. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.20. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

16.2.21. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 % Inhalation
Local exhaust ventilation - efficiency of at least	80 % Dermal
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.22. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

16.2.23. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.24. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.25. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

16.2.26. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.27. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.28. Control of worker exposure: Spraying (PROC11)

PROC11	Non industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
Indoors,Assumes large workrooms	
Maximum process temperature	≤ 56 °C

16.2.29. Control of worker exposure: Spraying (PROC11)

PROC11	Non industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	
Technical and organisational conditions and measures	
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
Indoors,Assumes large workrooms,and/or,Outdoors,close to buildings (< 4 m)	
Maximum process temperature	≤ 56 °C

16.2.30. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.2.31. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

16.2.32. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

16.3. Exposure estimation and reference to its source

16.3.1. Environmental release and exposure Use as binders and release agents (ERC8a, ERC8d)

Release route	Release rate	Release estimation method
Release fraction to wastewater	100 %	ERC
Release to waste water from process	21.32 kg/day	ERC
Release fraction to air from process	100 %	ERC
Release fraction to soil from process	20 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.881	10.6	0.083	EUSES v2.1.2
Marine water	mg/l	0.083	1.06	0.078	EUSES v2.1.2
Freshwater sediment	mg/kg	3.863	30.4	0.127	EUSES v2.1.2
Marine water sediment	mg/kg	0.365	3.04	0.12	EUSES v2.1.2
Sewage treatment plant	mg/l	1.327	100	0.013	EUSES v2.1.2
Soil	mg/kg	0.042	29.5	0.001	EUSES v2.1.2

16.3.2. Environmental release and exposure Use as binders and release agents (ERC8b, ERC8e)

Release route	Release rate	Release estimation method
Release fraction to wastewater	2 %	ERC
Release to waste water from process	0.426 kg/day	ERC
Release fraction to air from process	0.1 %	ERC
Release fraction to soil from process	1 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.751	10.6	0.071	EUSES v2.1.2
Marine water	mg/l	0.07	1.06	0.066	EUSES v2.1.2
Freshwater sediment	mg/kg	3.292	30.4	0.108	EUSES v2.1.2
Marine water sediment	mg/kg	0.308	3.04	0.101	EUSES v2.1.2
Sewage treatment plant	mg/l	0.027	100	0	EUSES v2.1.2
Soil	mg/kg	0.023	29.5	0.001	EUSES v2.1.2

16.3.3. Environmental release and exposure Use as binders and release agents (ERC8c, ERC8f)

Release route	Release rate	Release estimation method
Release fraction to wastewater	30 %	Worst case assumption
Release to waste water from process	6.395 kg/day	Worst case assumption
Release fraction to air from process	15 %	ERC
Release fraction to soil from process	0.5 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.788	10.6	0.074	EUSES v2.1.2
Marine water	mg/l	0.074	1.06	0.07	EUSES v2.1.2
Freshwater sediment	mg/kg	3.455	30.4	0.114	EUSES v2.1.2
Marine water sediment	mg/kg	0.324	3.04	0.107	EUSES v2.1.2
Sewage treatment plant	mg/l	0.398	100	0.004	EUSES v2.1.2
Soil	mg/kg	0.029	29.5	0.001	EUSES v2.1.2

16.3.4. Worker exposure Use in closed process; Storage (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.242 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.968 mg/m³	0	ECETOC TRA worker

16.3.5. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker

Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

16.3.6. Worker exposure Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.204	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

16.3.7. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

16.3.8. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

16.3.9. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.137	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

16.3.10. Worker exposure Mixing or blending in batch processes (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

16.3.11. Worker exposure Mixing or blending in batch processes (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

16.3.12. Worker exposure Mixing or blending in batch processes (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

16.3.13. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.247	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

16.3.14. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.447	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

16.3.15. Worker exposure Calendering (including Banburys) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	5.486 mg/kg bw/day	0.029	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.229	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

16.3.16. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

16.3.17. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

16.3.18. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

16.3.19. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

16.3.20. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

16.3.21. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.065	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

16.3.22. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

16.3.23. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

16.3.24. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.372 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

16.3.25. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker

Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.247	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

16.3.26. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.447	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

16.3.27. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.347	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

16.3.28. Worker exposure Spraying (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	107.1 mg/kg bw/day	0.576	ECETOC TRA worker
Inhalation - Long-term - systemic effects	5.5 mg/m³	0.005	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.581	
Acute - Local - Inhalation	1940 mg/m³	0.802	ECETOC TRA worker

16.3.29. Worker exposure Spraying (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	21.43 mg/kg bw/day	0.115	ECETOC TRA worker
Inhalation - Long-term - systemic effects	1000 mg/m³	0.826	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.941	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

16.3.30. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

16.3.31. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

16.3.32. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

16.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

16.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.

16.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

17. AC SE17: Polymer manufacturing

17.1. Title section

Polymer manufacturing

ES Ref.: AC SE17 ES Type: Worker	Association ref code: PW

Environment		
CS 1	Polymer manufacturing	ERC8a, ERC8d
CS 2	Polymer manufacturing	ERC8c, ERC8f
Worker		
CS 3	Use in closed process; Storage	PROC1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 5	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 6	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 7	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 8	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 9	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 10	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 11	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 12	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 13	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 14	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 15	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 16	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 17	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 18	Equipment cleaning and maintenance	PROC8a, PROC28
CS 19	Equipment cleaning and maintenance	PROC8a, PROC28
CS 20	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Widespread use by professional workers (PW)

17.2. Conditions of use affecting exposure

17.2.1. Control of environmental exposure: Polymer manufacturing (ERC8a, ERC8d)

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

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d

Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

17.2.2. Control of environmental exposure: Polymer manufacturing (ERC8c, ERC8f)

ERC8c	Widespread use leading to inclusion into/onto article (indoor)
ERC8f	Widespread use leading to inclusion into/onto article (outdoor)

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d
Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	
Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

17.2.3. Control of worker exposure: Use in closed process; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

17.2.4. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

17.2.5. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,outdoor	

Maximum process temperature	≤ 56 °C

17.2.6. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoor	
Maximum process temperature	≤ 56 °C

17.2.7. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoor	
Maximum process temperature	≤ 56 °C

17.2.8. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

17.2.9. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

17.2.10. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 % Inhalation
Local exhaust ventilation - efficiency of at least	80 % Dermal
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

17.2.11. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

17.2.12. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

17.2.13. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

17.2.14. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

17.2.15. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

17.2.16. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

17.2.17. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 5 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

17.2.18. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

17.2.19. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

17.2.20. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

17.3. Exposure estimation and reference to its source

17.3.1. Environmental release and exposure Polymer manufacturing (ERC8a, ERC8d)

Release route	Release rate	Release estimation method
Release fraction to wastewater	100 %	ERC
Release to waste water from process	21.32 kg/day	ERC
Release fraction to air from process	100 %	ERC
Release fraction to soil from process	20 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.881	10.6	0.083	EUSES v2.1.2
Marine water	mg/l	0.083	1.06	0.078	EUSES v2.1.2
Freshwater sediment	mg/kg	3.863	30.4	0.127	EUSES v2.1.2
Marine water sediment	mg/kg	0.365	3.04	0.12	EUSES v2.1.2
Sewage treatment plant	mg/l	1.327	100	0.013	EUSES v2.1.2
Soil	mg/kg	0.042	29.5	0.001	EUSES v2.1.2

17.3.2. Environmental release and exposure Polymer manufacturing (ERC8c, ERC8f)

Release route	Release rate	Release estimation method
Release fraction to wastewater	30 %	Worst case assumption
Release to waste water from process	6.395 kg/day	Worst case assumption
Release fraction to air from process	15 %	ERC
Release fraction to soil from process	0.5 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.7888	10.6	0.074	EUSES v2.1.2
Marine water	mg/l	0.074	1.06	0.07	EUSES v2.1.2
Freshwater sediment	mg/kg	3.455	30.4	0.114	EUSES v2.1.2
Marine water sediment	mg/kg	0.324	3.04	0.107	EUSES v2.1.2
Sewage treatment plant	mg/l	0.398	100	0.004	EUSES v2.1.2
Soil	mg/kg	0.029	29.5	0.001	EUSES v2.1.2

17.3.3. Worker exposure Use in closed process; Storage (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.242 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.968 mg/m³	0	ECETOC TRA worker

17.3.4. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

17.3.5. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

17.3.6. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

17.3.7. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

17.3.8. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

17.3.9. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

17.3.10. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.065	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

17.3.11. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

17.3.12. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

17.3.13. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.372 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

17.3.14. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.118	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

17.3.15. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.686 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.204	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

17.3.16. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.318	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

17.3.17. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.686 mg/kg bw/day	0.004	ECETOC TRA worker

Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.204	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

17.3.18. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

17.3.19. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

17.3.20. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

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

17.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.

17.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

18. AC SE18: Use in polymer processing

18.1. Title section

Use in polymer processing

ES Ref.: AC SE18 ES Type: Worker	Association ref code: PW

Environment		
CS 1	Use in polymer processing	ERC8a, ERC8d
CS 2	Use in polymer processing	ERC8c, ERC8f
Worker		
CS 3	Use in closed process; Storage	PROC1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 5	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 6	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 7	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 8	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 9	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 10	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 11	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 12	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 13	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 14	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 15	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 16	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 17	Tabletting, compression, extrusion, pelettisation, granulation	PROC14
CS 18	Equipment cleaning and maintenance	PROC8a, PROC28
CS 19	Equipment cleaning and maintenance	PROC8a, PROC28
CS 20	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Widespread use by professional workers (PW)

18.2. Conditions of use affecting exposure

18.2.1. Control of environmental exposure: Use in polymer processing (ERC8a, ERC8d)

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

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d

Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

18.2.2. Control of environmental exposure: Use in polymer processing (ERC8c, ERC8f)

ERC8c	Widespread use leading to inclusion into/onto article (indoor)
ERC8f	Widespread use leading to inclusion into/onto article (outdoor)

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d

Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

18.2.3. Control of worker exposure: Use in closed process; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

18.2.4. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

18.2.5. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	

Maximum process temperature	≤ 56 °C

18.2.6. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

18.2.7. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

18.2.8. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

18.2.9. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

18.2.10. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 % Inhalation
Local exhaust ventilation - efficiency of at least	80 % Dermal
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

18.2.11. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

18.2.12. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

18.2.13. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

18.2.14. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

18.2.15. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

18.2.16. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

18.2.17. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 5 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

18.2.18. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

18.2.19. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

18.2.20. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

18.3. Exposure estimation and reference to its source

18.3.1. Environmental release and exposure Use in polymer processing (ERC8a, ERC8d)

Release route	**Release rate**	**Release estimation method**
Release fraction to wastewater	100 %	ERC
Release to waste water from process	21.32 kg/day	ERC
Release fraction to air from process	100 %	ERC
Release fraction to soil from process	20 %	ERC

Protection target	**Unit**	**Exposure estimation**	**PNEC**	**RCR**	**Assessment method**
Freshwater	mg/l	0.881	10.6	0.083	EUSES v2.1.2
Marine water	mg/l	0.083	1.06	0.078	EUSES v2.1.2
Freshwater sediment	mg/kg	3.863	30.4	0.127	EUSES v2.1.2
Marine water sediment	mg/kg	0.365	3.04	0.12	EUSES v2.1.2
Sewage treatment plant	mg/l	1.327	100	0.013	EUSES v2.1.2
Soil	mg/kg	0.042	29.5	0.001	EUSES v2.1.2

18.3.2. Environmental release and exposure Use in polymer processing (ERC8c, ERC8f)

Release route	**Release rate**	**Release estimation method**
Release fraction to wastewater	30 %	Worst case assumption
Release to waste water from process	6.395 kg/day	Worst case assumption
Release fraction to air from process	15 %	ERC
Release fraction to soil from process	0.5 %	ERC

Protection target	**Unit**	**Exposure estimation**	**PNEC**	**RCR**	**Assessment method**
Freshwater	mg/l	0.788	10.6	0.074	EUSES v2.1.2
Marine water	mg/l	0.074	1.06	0.07	EUSES v2.1.2
Freshwater sediment	mg/kg	3.455	30.4	0.114	EUSES v2.1.2
Marine water sediment	mg/kg	0.324	3.04	0.107	EUSES v2.1.2
Sewage treatment plant	mg/l	0.398	100	0.004	EUSES v2.1.2
Soil	mg/kg	0.029	29.5	0.001	EUSES v2.1.2

18.3.3. Worker exposure Use in closed process; Storage (PROC1)

Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.242 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.968 mg/m³	0	ECETOC TRA worker

18.3.4. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

18.3.5. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

18.3.6. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

18.3.7. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

18.3.8. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

18.3.9. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

18.3.10. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.065	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

18.3.11. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

18.3.12. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

18.3.13. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.372 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

18.3.14. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.118	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

18.3.15. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.686 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.204	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

18.3.16. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.018	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.318	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

18.3.17. Worker exposure Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.686 mg/kg bw/day	0.004	ECETOC TRA worker

Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.204	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

18.3.18. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

18.3.19. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

18.3.20. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

18.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

18.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.

18.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

19. AC SE19: Use in Cleaning Agents

19.1. Title section

Use in Cleaning Agents

ES Ref.: AC SE19 ES Type: Worker	Association ref code: PW

Environment		
CS 1	Use in Cleaning Agents	ERC8a
Worker		
CS 2	Use in closed process; Storage	PROC1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 4	Use in closed batch process (synthesis or formulation); With occasional controlled exposure	PROC3
CS 5	Chemical production where opportunity for exposure arises	PROC4
CS 6	Chemical production where opportunity for exposure arises	PROC4
CS 7	Mixing or blending in batch processes	PROC5
CS 8	Mixing or blending in batch processes	PROC5
CS 9	Mixing or blending in batch processes	PROC5
CS 10	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 11	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 12	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 13	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 14	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 15	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 16	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC9
CS 17	Roller application or brushing	PROC10
CS 18	Roller application or brushing	PROC10
CS 19	Roller application or brushing	PROC10
CS 20	Spraying	PROC11
CS 21	Spraying	PROC11
CS 22	Treatment of articles by dipping and pouring	PROC13
CS 23	Treatment of articles by dipping and pouring	PROC13
CS 24	Manual activities involving hand contact	PROC19
CS 25	Manual activities involving hand contact	PROC19
CS 26	Manual activities involving hand contact	PROC19
CS 27	Equipment cleaning and maintenance	PROC8a, PROC28
CS 28	Equipment cleaning and maintenance	PROC8a, PROC28
CS 29	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Widespread use by professional workers (PW)

19.2. Conditions of use affecting exposure

19.2.1. Control of environmental exposure: Use in Cleaning Agents (ERC8a)

ERC8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d
Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

19.2.2. Control of worker exposure: Use in closed process; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 60 °C

19.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 60 °C

19.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Use in closed batch process (synthesis or formulation). With occasional controlled exposure	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 60 °C

19.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.6. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.7. Control of worker exposure: Mixing or blending in batch processes (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 60 °C

19.2.8. Control of worker exposure: Mixing or blending in batch processes (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.9. Control of worker exposure: Mixing or blending in batch processes (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.10. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 60 °C

19.2.11. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.12. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.13. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.14. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 % Inhalation
Local exhaust ventilation - efficiency of at least	80 % Dermal
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.15. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.16. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.17. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.18. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.19. Control of worker exposure: Roller application or brushing (PROC10)

PROC10	Roller application or brushing

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 60 °C

19.2.20. Control of worker exposure: Spraying (PROC11)

PROC11	Non industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoors,Assumes large workrooms	
Maximum process temperature	≤ 56 °C

19.2.21. Control of worker exposure: Spraying (PROC11)

PROC11	Non industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	

Technical and organisational conditions and measures	
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
Indoors,Assumes large workrooms,and/or,Outdoors,close to buildings (< 4 m)	
Maximum process temperature	≤ 60 °C

19.2.22. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid

Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.23. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.24. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.25. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.26. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 60 °C

19.2.27. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.2.28. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 60 °C

19.2.29. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 60 °C

19.3. Exposure estimation and reference to its source

19.3.1. Environmental release and exposure Use in Cleaning Agents (ERC8a)

Release route	Release rate	Release estimation method
Release fraction to wastewater	100 %	ERC
Release to waste water from process	21.32 kg/day	ERC
Release fraction to air from process	100 %	ERC
Release fraction to soil from process	0 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.881	10.6	0.083	EUSES v2.1.2
Marine water	mg/l	0.083	1.06	0.078	EUSES v2.1.2
Freshwater sediment	mg/kg	3.863	30.4	0.127	EUSES v2.1.2
Marine water sediment	mg/kg	0.365	3.04	0.12	EUSES v2.1.2
Sewage treatment plant	mg/l	1.327	100	0.013	EUSES v2.1.2
Soil	mg/kg	0.042	29.5	0.001	EUSES v2.1.2

19.3.2. Worker exposure Use in closed process; Storage (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.242 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.968 mg/m³	0	ECETOC TRA worker

19.3.3. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

19.3.4. Worker exposure Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.204	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

19.3.5. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

19.3.6. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.137	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

19.3.7. Worker exposure Mixing or blending in batch processes (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

19.3.8. Worker exposure Mixing or blending in batch processes (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

19.3.9. Worker exposure Mixing or blending in batch processes (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

19.3.10. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

19.3.11. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

19.3.12. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

19.3.13. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

19.3.14. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.065	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

19.3.15. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

19.3.16. Worker exposure Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.372 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

19.3.17. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker

Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.447	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

19.3.18. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.347	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

19.3.19. Worker exposure Roller application or brushing (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	27.43 mg/kg bw/day	0.147	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.247	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

19.3.20. Worker exposure Spraying (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	107.1 mg/kg bw/day	0.576	ECETOC TRA worker
Inhalation - Long-term - systemic effects	5.5 mg/m³	0.005	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.581	
Acute - Local - Inhalation	1940 mg/m³	0.802	ECETOC TRA worker

19.3.21. Worker exposure Spraying (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	21.43 mg/kg bw/day	0.115	ECETOC TRA worker
Inhalation - Long-term - systemic effects	1000 mg/m³	0.826	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.941	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

19.3.22. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

19.3.23. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.115	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

19.3.24. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.352	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

19.3.25. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.452	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

19.3.26. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	141.4 mg/kg bw/day	0.76	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.86	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

19.3.27. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

19.3.28. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

19.3.29. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

19.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

19.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.

19.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

20. AC SE20: Oil field well drilling and production operations

20.1. Title section

Oil field well drilling and production operations

ES Ref.: AC SE20 ES Type: Worker	Association ref code: PW

Environment		
CS 1	Oil field well drilling and production operations	ERC8d
Worker		
CS 2	Use in closed process; Storage	PROC1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 4	Use in closed batch process (synthesis or formulation); With occasional controlled exposure	PROC3
CS 5	Chemical production where opportunity for exposure arises	PROC4
CS 6	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 7	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 8	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Widespread use by professional workers (PW)

20.2. Conditions of use affecting exposure

20.2.1. Control of environmental exposure: Oil field well drilling and production operations (ERC8d)

ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d

Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

20.2.2. Control of worker exposure: Use in closed process; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

20.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

20.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Use in closed batch process (synthesis or formulation). With occasional controlled exposure	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

20.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

20.2.6. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,outdoor	

Maximum process temperature	≤ 56 °C

20.2.7. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

20.2.8. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 40 °C

20.3. Exposure estimation and reference to its source

20.3.1. Environmental release and exposure Oil field well drilling and production operations (ERC8d)

Release route	**Release rate**	**Release estimation method**
Release fraction to wastewater	100 %	ERC
Release to waste water from process	21.32 kg/day	ERC
Release fraction to air from process	100 %	ERC
Release fraction to soil from process	20 %	ERC

Protection target	**Unit**	**Exposure estimation**	**PNEC**	**RCR**	**Assessment method**
Freshwater	mg/l	0.881	10.6	0.083	EUSES v2.1.2
Marine water	mg/l	0.083	1.06	0.078	EUSES v2.1.2
Freshwater sediment	mg/kg	3.863	30.4	0.127	EUSES v2.1.2
Marine water sediment	mg/kg	0.365	3.04	0.12	EUSES v2.1.2
Sewage treatment plant	mg/l	1.327	100	0.013	EUSES v2.1.2
Soil	mg/kg	0.042	29.5	0.001	EUSES v2.1.2

20.3.2. Worker exposure Use in closed process; Storage (PROC1)

Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.242 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.968 mg/m³	0	ECETOC TRA worker

20.3.3. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

20.3.4. Worker exposure Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.204	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

20.3.5. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

20.3.6. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

20.3.7. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

20.3.8. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

20.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

20.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.

20.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

21. AC SE21: Use in Agrochemicals

21.1. Title section

Use in Agrochemicals

ES Ref.: AC SE21 ES Type: Worker	Association ref code: PW

Environment		
CS 1	Spray application of plant protection products containing co-formulants (indoor or outdoor)	ERC8a, ERC8d
CS 2	Direct application of plant protection products (granules or treated seeds) containing co-formulants to soil (indoor or outdoor)	ERC8a, ERC8d
Worker		
CS 3	Use in closed process; Storage	PROC1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 5	Chemical production where opportunity for exposure arises	PROC4
CS 6	Chemical production where opportunity for exposure arises	PROC4
CS 7	Chemical production where opportunity for exposure arises	PROC4
CS 8	Dispersing seeds / granules: delivery of seeds and application	PROC8a
CS 9	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 10	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 11	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 12	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 13	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 14	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 15	Seed treatment: Mixing / loading and transfer of treated seeds from batch treater into bags	PROC8a, PROC8b
CS 16	Tractor mounted spraying	PROC8a, PROC11
CS 17	Hand-held spraying	PROC8a, PROC11
CS 18	Spraying	PROC11
CS 19	Spraying	PROC11
CS 20	Treatment of articles by dipping and pouring	PROC13
CS 21	Treatment of articles by dipping and pouring	PROC13
CS 22	Treatment of articles by dipping and pouring	PROC13
CS 23	Manual activities involving hand contact	PROC19
CS 24	Manual activities involving hand contact	PROC19
CS 25	Manual activities involving hand contact	PROC19
CS 26	Equipment cleaning and maintenance	PROC8a, PROC28
CS 27	Equipment cleaning and maintenance	PROC8a, PROC28
CS 28	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Widespread use by professional workers (PW)

21.2. Conditions of use affecting exposure

21.2.1. Control of environmental exposure: Spray application of plant protection products containing co-formulants (indoor or outdoor) (ERC8a, ERC8d)

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

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.018 t/d

Application rate	168 kg/ha
Number of applications	1
Application interval	1 days

Conditions and measures related to sewage treatment plant
Not applicable as there is no release to wastewater

Conditions and measures related to treatment of waste (including article waste)
Dispose of waste in accordance with environmental legislation

21.2.2. Control of environmental exposure: Direct application of plant protection products (granules or treated seeds) containing co-formulants to soil (indoor or outdoor) (ERC8a, ERC8d)

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

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.018 t/d
Application rate	34.1 kg/ha
Number of applications	1
Application interval	1 days

Conditions and measures related to sewage treatment plant
Municipal Sewage Treatment Plant

Conditions and measures related to treatment of waste (including article waste)
Dispose of waste in accordance with environmental legislation

21.2.3. Control of worker exposure: Use in closed process; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

21.2.4. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

21.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

21.2.6. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

21.2.7. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

21.2.8. Control of worker exposure: Dispersing seeds / granules: delivery of seeds and application (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Solid

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Application rate	527.3 kg/ha

Other conditions affecting workers exposure	
Manual dispersion by hand: Areas not exceeding 200 m² per day,Hand-held equipment: area up to 1 ha per day,Tractor-mounted spreaders: 20 ha per day,Loader / Applicator, Belly Grinder: 1 ha per day	
indoor,and/or,Outdoor	

21.2.9. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

21.2.10. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

21.2.11. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

21.2.12. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid

Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

21.2.13. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

21.2.14. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	90 % Inhalation
Local exhaust ventilation - efficiency of at least	80 % Dermal
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

21.2.15. Control of worker exposure: Seed treatment: Mixing / loading and transfer of treated seeds from batch treater into bags (PROC8a, PROC8b)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
Product (article) characteristics	
Physical form of product	Solid, high dustiness
Concentration of substance in product	Concentration of substance in dust is assumed 50% of its initial concentration (default: 100%) in the PPP
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Application rate	20 kg/ha

Other conditions affecting workers exposure	
20 ha (Default area for tractor)	
indoor,and/or,Outdoor	

21.2.16. Control of worker exposure: Tractor mounted spraying (PROC8a, PROC11)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC11	Non industrial spraying

Product (article) characteristics	
Physical form of product	Liquid

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Application rate	105.2 kg/ha

Technical and organisational conditions and measures	
Ensure material transfers are under containment or extract ventilation	
Local exhaust ventilation - efficiency of at least	80

Other conditions affecting workers exposure	
Tractor-mounted ground boom sprayer (20 ha/day) or tractor-mounted airblast sprayer (8 ha/day)	
indoor,and/or,Outdoor	

21.2.17. Control of worker exposure: Hand-held spraying (PROC8a, PROC11)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC11	Non industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Other product characteristics	Exposure to vapour (in addition to aerosol) is calculated based on a continuous release of the volatile substance (VP >=0.1Pa) over 6 h limited by ventilation (1/h)

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Application rate	41.4 kg/ha

Other conditions affecting workers exposure	
Hand-held sprayer, hydraulic nozzles. high-level target, 1 ha per day	
indoor,and/or,Outdoor	
Outdoor and greenhouse applications are covered	

21.2.18. Control of worker exposure: Spraying (PROC11)

PROC11	Non industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
Indoors,Assumes large workrooms	
Maximum process temperature	≤ 56 °C

21.2.19. Control of worker exposure: Spraying (PROC11)

PROC11	Non industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	

Technical and organisational conditions and measures	
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
Indoors,Assumes large workrooms,and/or,Outdoors,close to buildings (< 4 m)	
Maximum process temperature	≤ 56 °C

21.2.20. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Efficiency	30 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

21.2.21. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

21.2.22. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

PROC13	Treatment of articles by dipping and pouring

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

21.2.23. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

21.2.24. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

21.2.25. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

21.2.26. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

21.2.27. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Efficiency	70 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

21.2.28. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour)	
Local exhaust ventilation - efficiency of at least	80 %
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor	
Maximum process temperature	≤ 56 °C

21.3. Exposure estimation and reference to its source

21.3.1. Environmental release and exposure Spray application of plant protection products containing co-formulants (indoor or outdoor) (ERC8a, ERC8d)

Release route	Release rate	Release estimation method
Application type		Spray treatment
Release fraction to wastewater	0 %	ECPA SPERC 8d.2.v2
Release to waste water from process	0 kg/day	ECPA SPERC 8d.2.v2
Release fraction to air from process	100 %	ECPA SPERC 8d.2.v2
Release fraction to soil from process	0 %	ECPA SPERC 8d.2.v2

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	9.554	10.6	0.901	ECPA LET v3 (2015)
Marine water	mg/l	0.95	1.06	0.896	ECPA LET v3 (2015)
Freshwater sediment	mg/kg	3.32	30.4	0.109	ECPA LET v3 (2015)
Marine water sediment	mg/kg	0.317	3.04	0.104	ECPA LET v3 (2015)
Soil	mg/kg	0.023	29.5	0.001	ECPA LET v3 (2015)

21.3.2. Environmental release and exposure Direct application of plant protection products (granules or treated seeds) containing co-formulants to soil (indoor or outdoor) (ERC8a, ERC8d)

Release route	Release rate	Release estimation method
Application type		Granule application / Seed treatment
Release fraction to wastewater	0 %	ECPA SPERC 8d.1.v2
Release to waste water from process	0 kg/day	ECPA SPERC 8d.1.v2
Release fraction to air from process	0 %	ECPA SPERC 8d.1.v2
Release fraction to soil from process	100 %	ECPA SPERC 8d.1.v2

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	5.47	10.6	0.516	ECPA LET v3 (2015)
Marine water	mg/l	0.542	1.06	0.511	ECPA LET v3 (2015)
Freshwater sediment	mg/kg	3.21	30.4	0.106	ECPA LET v3 (2015)
Marine water sediment	mg/kg	0.301	3.04	0.099	ECPA LET v3 (2015)
Soil	mg/kg	26.6	29.5	0.902	ECPA LET v3 (2015)

21.3.3. Worker exposure Use in closed process; Storage (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.242 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.968 mg/m³	0	ECETOC TRA worker

21.3.4. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

21.3.5. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	

Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

21.3.6. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.387	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

21.3.7. Worker exposure Chemical production where opportunity for exposure arises (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.037	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.137	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

21.3.8. Worker exposure Dispersing seeds / granules: delivery of seeds and application (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	166.3 mg/kg bw/day	0.894	ECPA OWB v3.2 (2015)
Inhalation - Long-term - systemic effects	7.22 mg/m³	0.006	ECPA OWB v3.2 (2015)
Sum RCR - Long-term - systemic effects		0.9	

21.3.9. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

21.3.10. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

21.3.11. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

21.3.12. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker

Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

21.3.13. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

21.3.14. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	60.5 mg/m³	0.05	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.065	
Acute - Local - Inhalation	242 mg/m³	0.1	ECETOC TRA worker

21.3.15. Worker exposure Seed treatment: Mixing / loading and transfer of treated seeds from batch treater into bags (PROC8a, PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	7.203 mg/kg bw/day	0.039	ECPA OWB v3.2 (2015)
Inhalation - Long-term - systemic effects	25 mg/m³	0.021	ECPA OWB v3.2 (2015)
Sum RCR - Long-term - systemic effects		0.06	

21.3.16. Worker exposure Tractor mounted spraying (PROC8a, PROC11)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	167.2 mg/kg bw/day	0.899	ECPA OWB v3.2 (2015)
Inhalation - Long-term - systemic effects	2.03 mg/m³	0.002	ECPA OWB v3.2 (2015)
Sum RCR - Long-term - systemic effects		0.901	

21.3.17. Worker exposure Hand-held spraying (PROC8a, PROC11)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	145.1 mg/kg bw/day	0.78	ECPA OWB v3.2
Inhalation - Long-term - systemic effects	145.2 mg/m³	0.12	ECPA OWB v3.2
Sum RCR - Long-term - systemic effects		0.9	

21.3.18. Worker exposure Spraying (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	107.1 mg/kg bw/day	0.576	ECETOC TRA worker
Inhalation - Long-term - systemic effects	5.5 mg/m³	0.005	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.581	
Acute - Local - Inhalation	1940 mg/m³	0.802	ECETOC TRA worker

21.3.19. Worker exposure Spraying (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	21.43 mg/kg bw/day	0.115	ECETOC TRA worker
Inhalation - Long-term - systemic effects	1000 mg/m³	0.826	Used ART model (v1.5)

Sum RCR - Long-term - systemic effects		0.941	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

21.3.20. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

21.3.21. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.115	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

21.3.22. Worker exposure Treatment of articles by dipping and pouring (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

21.3.23. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.352	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

21.3.24. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	28.29 mg/kg bw/day	0.152	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.452	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

21.3.25. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	141.4 mg/kg bw/day	0.76	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.86	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

21.3.26. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker

Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

21.3.27. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	363 mg/m³	0.3	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.374	
Acute - Local - Inhalation	1450 mg/m³	0.599	ECETOC TRA worker

21.3.28. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	2.742 mg/kg bw/day	0.015	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.215	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

21.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

21.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.
Environment Scaling Method	ECPA LET
Environment Scalable parameters	Application rate,Number of applications,Application interval,Crop (drift rate),Location and period of application

21.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.
Health Scaling Method	ECPA OWB,(Contributing scenarios CS 8, CS 15, CS 16, CS 17)
Health Scalable parameters	Application rate,Personal protection,Respiratory protection,Local exhaust ventilation

22. AC SE22: Use in de-icing and anti-icing fluids

22.1. Title section

Use in de-icing and anti-icing fluids

ES Ref.: AC SE22 ES Type: Worker	Association ref code: PW

Environment		
CS 1	Use in de-icing and anti-icing fluids	ERC8d
Worker		
CS 2	Use in closed process; Storage	PROC1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC2
CS 4	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 5	Spraying	PROC11
CS 6	Manual activities involving hand contact	PROC19
CS 7	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Widespread use by professional workers (PW)

22.2. Conditions of use affecting exposure

22.2.1. Control of environmental exposure: Use in de-icing and anti-icing fluids (ERC8d)

ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)

Amount used, frequency and duration of use (or from service life)	
Amounts used	≤ 0.021 t/d

Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

22.2.2. Control of worker exposure: Use in closed process; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

22.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

22.2.4. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

22.2.5. Control of worker exposure: Spraying (PROC11)

PROC11	Non industrial spraying

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Moderate application rate (0.3 - 3 l/minute)	

Technical and organisational conditions and measures	
Surface spraying of liquids. Spraying with no or low compressed air use	
Ensure that direction of application is only horizontal or downward.	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Wear gloves providing a minimum efficiency of (%):	80 % (EN 374)

Other conditions affecting workers exposure	
Indoors,Assumes large workrooms,and/or,Outdoors,close to buildings (< 4 m)	
Maximum process temperature	≤ 60 °C

22.2.6. Control of worker exposure: Manual activities involving hand contact (PROC19)

PROC19	Manual activities involving hand contact

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

22.2.7. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

22.3. Exposure estimation and reference to its source

22.3.1. Environmental release and exposure Use in de-icing and anti-icing fluids (ERC8d)

Release route	Release rate	Release estimation method
Release fraction to wastewater	100 %	ERC
Release to waste water from process	21.32 kg/day	ERC
Release fraction to air from process	100 %	ERC
Release fraction to soil from process	20 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.881	10.6	0.083	EUSES v2.1.2
Marine water	mg/l	0.083	1.06	0.078	EUSES v2.1.2
Freshwater sediment	mg/kg	3.863	30.4	0.127	EUSES v2.1.2
Marine water sediment	mg/kg	0.365	3.04	0.12	EUSES v2.1.2
Sewage treatment plant	mg/l	1.327	100	0.013	EUSES v2.1.2
Soil	mg/kg	0.042	29.5	0.001	EUSES v2.1.2

22.3.2. Worker exposure Use in closed process; Storage (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.242 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.968 mg/m³	0	ECETOC TRA worker

22.3.3. Worker exposure Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.007	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.107	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

22.3.4. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

22.3.5. Worker exposure Spraying (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	21.43 mg/kg bw/day	0.115	ECETOC TRA worker
Inhalation - Long-term - systemic effects	1000 mg/m³	0.826	Used ART model (v1.5)
Sum RCR - Long-term - systemic effects		0.941	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

22.3.6. Worker exposure Manual activities involving hand contact (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	141.4 mg/kg bw/day	0.76	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.86	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

22.3.7. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

22.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

22.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.

22.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

23. AC SE23: Explosives manufacture and use

23.1. Title section

Explosives manufacture and use

ES Ref.: AC SE23 ES Type: Worker	Association ref code: PW

Environment		
CS 1	Explosives manufacture and use	ERC8d
Worker		
CS 2	Use in closed process; Storage	PROC1
CS 3	Use in closed batch process (synthesis or formulation); With occasional controlled exposure	PROC3
CS 4	Mixing or blending in batch processes	PROC5
CS 5	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities	PROC8a
CS 6	Transfer of substance or mixture (charging and discharging) at dedicated facilities	PROC8b
CS 7	Equipment cleaning and maintenance	PROC8a, PROC28

Processes, tasks, activities covered	Widespread use by professional workers (PW)

23.2. Conditions of use affecting exposure

23.2.1. Control of environmental exposure: Explosives manufacture and use (ERC8d)

ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)

Amount used, frequency and duration of use (or from service life)

Amounts used	≤ 0.021 t/d

Conditions and measures related to sewage treatment plant

Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)

Dispose of waste in accordance with environmental legislation	

23.2.2. Control of worker exposure: Use in closed process; Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics

Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure

Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures

Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Other conditions affecting workers exposure

indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

23.2.3. Control of worker exposure: Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product (article) characteristics

Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure

Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures

Use in closed batch process (synthesis or formulation). With occasional controlled exposure	

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

23.2.4. Control of worker exposure: Mixing or blending in batch processes (PROC5)

PROC5	Mixing or blending in batch processes

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,outdoor	
Maximum process temperature	≤ 56 °C

23.2.5. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)
Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

23.2.6. Control of worker exposure: Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day
Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	
Other conditions affecting workers exposure	
outdoor	
Maximum process temperature	≤ 56 °C

23.2.7. Control of worker exposure: Equipment cleaning and maintenance (PROC8a, PROC28)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Exposure duration	≤ 8 h/day

Technical and organisational conditions and measures	
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator providing a minimum efficiency of (%):	90 % (APF 10)

Other conditions affecting workers exposure	
indoor,and/or,Outdoor	
Maximum process temperature	≤ 56 °C

23.3. Exposure estimation and reference to its source

23.3.1. Environmental release and exposure Explosives manufacture and use (ERC8d)

Release route	Release rate	Release estimation method
Release fraction to wastewater	100 %	ERC
Release to waste water from process	21.32 kg/day	ERC
Release fraction to air from process	100 %	ERC
Release fraction to soil from process	20 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.881	10.6	0.083	EUSES v2.1.2
Marine water	mg/l	0.083	1.06	0.078	EUSES v2.1.2
Freshwater sediment	mg/kg	3.863	30.4	0.127	EUSES v2.1.2
Marine water sediment	mg/kg	0.365	3.04	0.12	EUSES v2.1.2
Sewage treatment plant	mg/l	1.327	100	0.013	EUSES v2.1.2
Soil	mg/kg	0.042	29.5	0.001	EUSES v2.1.2

23.3.2. Worker exposure Use in closed process; Storage (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.034 mg/kg bw/day	0	ECETOC TRA worker
Inhalation - Long-term - systemic effects	0.242 mg/m³	0	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0	
Acute - Local - Inhalation	0.968 mg/m³	0	ECETOC TRA worker

23.3.3. Worker exposure Use in closed batch process (synthesis or formulation); With occasional controlled exposure (PROC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.69 mg/kg bw/day	0.004	ECETOC TRA worker
Inhalation - Long-term - systemic effects	242 mg/m³	0.2	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.204	
Acute - Local - Inhalation	968 mg/m³	0.4	ECETOC TRA worker

23.3.4. Worker exposure Mixing or blending in batch processes (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

23.3.5. Worker exposure Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

23.3.6. Worker exposure Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	423.5 mg/m³	0.35	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.424	
Acute - Local - Inhalation	1690 mg/m³	0.698	ECETOC TRA worker

23.3.7. Worker exposure Equipment cleaning and maintenance (PROC8a, PROC28)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.074	ECETOC TRA worker
Inhalation - Long-term - systemic effects	121 mg/m³	0.1	ECETOC TRA worker
Sum RCR - Long-term - systemic effects		0.174	
Acute - Local - Inhalation	484 mg/m³	0.2	ECETOC TRA worker

23.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

23.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.

23.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

24. AC SE24: Consumer use

24.1. Title section

Consumer use

ES Ref.: AC SE24 ES Type: Consumer	Association ref code: C

Environment		
	Contributing scenario controlling environmental exposure	ERC8d
Consumer		
	Glues, hobby use	PC1
	Glue from spray	PC1
	Sealants, including foam applications	PC1
	Glues DIY-use (carpet glue, tile glue, wood parquet glue)	PC1
	Air care, instant action (aerosol sprays) (premium grade only)	PC3
	Air care, continuous action (solid and liquid) (premium grade only)	PC3
	Washing car window	PC4
	Pouring into radiator	PC4
	Lock de-icer	PC4
	Waterborne latex wall paint	PC9a
	Solvent rich, high solid, water borne paint	PC9a
	Coatings and paints, thinners, paint removers - Aerosol spray can	PC9a
	Removers (paint-, glue-, wall paper-, sealant-remover)	PC9a
	Fillers and putty	PC9b
	Plasters and floor equalizers	PC9b
	Modelling clay	PC9b
	Finger paints	PC9c
	Solvent rich, high solid, water borne paint	PC15
	Non-metal-surface treatment products - Aerosol spray can	PC15
	Removers (paint-, glue-, wall paper-, sealant-remover)	PC15
	liquids	PC24
	Pastes	PC24
	Lubricants, Greases and Release Products - Sprays	PC24
	Polishes, wax / cream (floor, furniture, shoes)	PC31
	Polishes, spray (furniture, shoes)	PC31
	Laundry and dish washing products	PC35
	Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners)	PC35
	Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)	PC35
	Welding and soldering products, flux products	PC38
	Cosmetics, personal care products (premium grade only)	PC39

Processes, tasks, activities covered	Consumer use (C)

24.2. Conditions of use affecting exposure

24.2.1. Control of environmental exposure: Contributing scenario controlling environmental exposure (ERC8d)

ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)

Amount used, frequency and duration of use (or from service life)	
Daily amount for wide disperse uses	≤ 0.011 t/d

Conditions and measures related to sewage treatment plant	
Municipal Sewage Treatment Plant	

Conditions and measures related to treatment of waste (including article waste)	
Dispose of waste in accordance with environmental legislation	

24.2.2. Control of consumer exposure: Glues, hobby use (PC1)

PC1	Adhesives, sealants

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 30 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	9 g
Covers exposure up to	364 days/yr
Covers exposure up to	4 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	35.73 cm^2
Covers use in room size of	20 m^3

24.2.3. Control of consumer exposure: Glue from spray (PC1)

PC1	Adhesives, sealants

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 30 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	85.05 g
Covers exposure up to	11 days/yr
Covers exposure up to	4 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	35.73 cm^2
Covers use in room size of	20 m^3

24.2.4. Control of consumer exposure: Sealants, including foam applications (PC1)

PC1	Adhesives, sealants

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 30 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	75 g
Covers exposure up to	364 days/yr
Covers exposure up to	1 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	35.73 cm^2
Covers use in room size of	20 m^3

24.2.5. Control of consumer exposure: Glues DIY-use (carpet glue, tile glue, wood parquet glue) (PC1)

PC1	Adhesives, sealants

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 30 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	6390 g
Covers exposure up to	1 days/yr

Covers exposure up to	6 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	110 cm²
Covers use in room size of	20 m³

24.2.6. Control of consumer exposure: Air care, instant action (aerosol sprays) (premium grade only) (PC3)

PC3	Air care products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 50 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	0.1 g
Covers exposure up to	365 days/yr
Covers exposure up to	0.25 h/event
Covers exposure up to,4 times a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers use in room size of	20 m³

24.2.7. Control of consumer exposure: Air care, continuous action (solid and liquid) (premium grade only) (PC3)

PC3	Air care products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 10 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	0.48 g
Covers exposure up to	364 days/yr
Covers exposure up to,1 time a day	
Covers exposure up to	8 h/event

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	35.7 cm²
Covers use in room size of	20 m³

24.2.8. Control of consumer exposure: Washing car window (PC4)

PC4	Anti-Freeze and De-icing products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 1 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	0.5 g
Covers exposure up to	364 days/yr
Covers exposure up to	0.02 h/event
Covers exposure up to,1 time a day	

Other conditions affecting consumer exposure	
Covers use in a one car garage (34 m³) under typical ventilation	

24.2.9. Control of consumer exposure: Pouring into radiator (PC4)

PC4	Anti-Freeze and De-icing products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 10 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	2000 g
Covers exposure up to	364 days/yr
Covers exposure up to	0.17 h/event
Covers exposure up to,1 time a day	

Other conditions affecting consumer exposure	
Covers skin contact area up to	428 cm²
Covers use in a one car garage (34 m³) under typical ventilation	

24.2.10. Control of consumer exposure: Lock de-icer (PC4)

PC4	Anti-Freeze and De-icing products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 50 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	4 g
Covers exposure up to	364 days/yr
Covers exposure up to	0.25 h/event
Covers exposure up to,1 time a day	

Other conditions affecting consumer exposure	
Covers skin contact area up to	214.4 cm²
Covers use in a one car garage (34 m³) under typical ventilation	

24.2.11. Control of consumer exposure: Waterborne latex wall paint (PC9a)

PC9a	Coatings and paints, thinners, paint removers

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 1,5 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	2760 g
Covers exposure up to	11 days/yr
Covers exposure up to	2.2 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	428.75 cm²
Covers use in room size of	20 m³

24.2.12. Control of consumer exposure: Solvent rich, high solid, water borne paint (PC9a)

PC9a	Coatings and paints, thinners, paint removers

24.2.13. Control of consumer exposure: Coatings and paints, thinners, paint removers - Aerosol spray can (PC9a)

PC9a	Coatings and paints, thinners, paint removers

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 50 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	215 g
Covers exposure up to	11 days/yr
Covers exposure up to	0.33 h/event
Covers exposure up to,1 time a day	

Other conditions affecting consumer exposure	
Covers use in a one car garage (34 m³) under typical ventilation	

24.2.14. Control of consumer exposure: Removers (paint-, glue-, wall paper-, sealant-remover) (PC9a)

PC9a	Coatings and paints, thinners, paint removers

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	491 g
Covers exposure up to	11 days/yr
Covers exposure up to	2 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	857.5 cm^2
Covers use in room size of	20 m^3

24.2.15. Control of consumer exposure: Fillers and putty (PC9b)

PC9b	Fillers, putties, plasters, modelling clay

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 2 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	85 g
Covers exposure up to	51 days/yr
Covers exposure up to	4 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	35.73 cm^2
Covers use in room size of	20 m^3

24.2.16. Control of consumer exposure: Plasters and floor equalizers (PC9b)

PC9b	Fillers, putties, plasters, modelling clay

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 2 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	13800 g
Covers exposure up to	51 days/yr
Covers exposure up to	2 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	857.5 cm^2
Covers use in room size of	20 m^3

24.2.17. Control of consumer exposure: Modelling clay (PC9b)

PC9b	Fillers, putties, plasters, modelling clay

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 1 %

Amount used (or contained in articles), frequency and duration of use/exposure	
For each use event, assumes swallowed amount of :	1 g
Covers exposure up to	364 days/yr

Covers exposure up to,1 time a day	

Other conditions affecting consumer exposure	
Covers skin contact area up to	254.4 cm²

24.2.18. Control of consumer exposure: Finger paints (PC9c)

PC9c	Finger paints

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 50 %

Amount used (or contained in articles), frequency and duration of use/exposure	
For each use event, assumes swallowed amount of :	1.35 g
Covers exposure up to	364 days/yr
Covers exposure up to,1 time a day	

Other conditions affecting consumer exposure	
Covers skin contact area up to	254.4 cm²

24.2.19. Control of consumer exposure: Solvent rich, high solid, water borne paint (PC15)

PC15	Non-metal-surface treatment products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 27.5 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	744 g
Covers exposure up to	11 days/yr
Covers exposure up to	2.2 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	428.75 cm²
Covers use in room size of	20 m³

24.2.20. Control of consumer exposure: Non-metal-surface treatment products - Aerosol spray can (PC15)

PC15	Non-metal-surface treatment products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 50 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	215 g
Covers exposure up to	11 days/yr
Covers exposure up to	0.33 h/event
Covers exposure up to,1 time a day	

Other conditions affecting consumer exposure	
Covers use in a one car garage (34 m³) under typical ventilation	

24.2.21. Control of consumer exposure: Removers (paint-, glue-, wall paper-, sealant-remover) (PC15)

PC15	Non-metal-surface treatment products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 50 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	491 g
Covers exposure up to	11 days/yr
Covers exposure up to	2 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	857.5 cm²
Covers use in room size of	20 m³

24.2.22. Control of consumer exposure: liquids (PC24)

PC24	Lubricants, greases, release products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	2200 g
Covers exposure up to	11 days/yr
Covers exposure up to	0.17 h/event
Covers exposure up to,1 time a day	

Other conditions affecting consumer exposure	
Covers skin contact area up to	468 cm²
Covers use in a one car garage (34 m³) under typical ventilation	

24.2.23. Control of consumer exposure: Pastes (PC24)

PC24	Lubricants, greases, release products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 20 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	34 g
Covers exposure up to	11 days/yr
Covers exposure up to,1 time a day	

Other conditions affecting consumer exposure	
Covers skin contact area up to	468 cm²

24.2.24. Control of consumer exposure: Lubricants, Greases and Release Products - Sprays (PC24)

PC24	Lubricants, greases, release products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 50 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	73 g
Covers exposure up to	11 days/yr
Covers exposure up to	0.17 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	428.75 cm²
Covers use in room size of	20 m³

24.2.25. Control of consumer exposure: Polishes, wax / cream (floor, furniture, shoes) (PC31)

PC31	Polishes and wax blends

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 50 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	142 g
Covers exposure up to	51 days/yr
Covers exposure up to	1.23 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	430 cm²
Covers use in room size of	20 m³

24.2.26. Control of consumer exposure: Polishes, spray (furniture, shoes) (PC31)

PC31	Polishes and wax blends

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 50 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	35 g
Covers exposure up to	11 days/yr
Covers exposure up to	0.33 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	430 cm²
Covers use in room size of	20 m³

24.2.27. Control of consumer exposure: Laundry and dish washing products (PC35)

PC35	Washing and cleaning products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 5 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	15 g
Covers exposure up to	364 days/yr
Covers exposure up to	0.5 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	857.5 cm²
Covers use in room size of	20 m³

24.2.28. Control of consumer exposure: Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners) (PC35)

PC35	Washing and cleaning products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 5 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	27 g
Covers exposure up to	364 days/yr
Covers exposure up to	0.33 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	857.5 cm²
Covers use in room size of	20 m³

24.2.29. Control of consumer exposure: Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) (PC35)

PC35	Washing and cleaning products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 15 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	35 g
Covers exposure up to	364 days/yr
Covers exposure up to	0.17 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers skin contact area up to	428 cm^2
Covers use in room size of	20 m^3

24.2.30. Control of consumer exposure: Welding and soldering products, flux products (PC38)

PC38	Welding and soldering products, flux products

Product (article) characteristics	
Concentration of substance in product	Limit the substance in product to 20 %

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used per event	12 g
Covers exposure up to	364 days/yr
Covers exposure up to	1 h/event
Covers exposure up to,1 time a day	

Conditions and measures related to information and behavioural advice to consumers	
Covers use under typical household ventilation	

Other conditions affecting consumer exposure	
Covers use in room size of	20 m^3

24.2.31. Control of consumer exposure: Cosmetics, personal care products (premium grade only) (PC39)

PC39	Cosmetics, personal care products

Product (article) characteristics	
Physical form of product	Liquid

24.3. Exposure estimation and reference to its source

24.3.1. Environmental release and exposure Contributing scenario controlling environmental exposure (ERC8d)

Release route	Release rate	Release estimation method
Release fraction to wastewater	100 %	ERC
Release to waste water from process	106.6 kg/day	ERC
Release fraction to air from process	100 %	ERC
Release fraction to soil from process	20 %	ERC

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	1.412	10.6	0.133	EUSES v2.1.2
Marine water	mg/l	0.136	1.06	0.128	EUSES v2.1.2
Freshwater sediment	mg/kg	6.191	30.4	0.204	EUSES v2.1.2
Marine water sediment	mg/kg	0.598	3.04	0.197	EUSES v2.1.2
Sewage treatment plant	mg/l	6.637	100	0.066	EUSES v2.1.2
Soil	mg/kg	0.12	29.5	0.004	EUSES v2.1.2

24.3.2. Consumer exposure Glues, hobby use (PC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2

Dermal - Long-term - systemic effects	1.79 mg/kg bw/day	0.029	{0} EGRET v2
Inhalation - Long-term - systemic effects	8.52 mg/m³	0.043	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.072	

24.3.3. Consumer exposure Glue from spray (PC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	0.09 mg/kg bw/day	0.001	{0} EGRET v2
Inhalation - Long-term - systemic effects	80.06 mg/m³	0.4	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.401	

24.3.4. Consumer exposure Sealants, including foam applications (PC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	1.79 mg/kg bw/day	0.029	{0} EGRET v2
Inhalation - Long-term - systemic effects	35.75 mg/m³	0.179	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.208	

24.3.5. Consumer exposure Glues DIY-use (carpet glue, tile glue, wood parquet glue) (PC1)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	3 mg/kg bw/day	0.048	{0} EGRET v2
Inhalation - Long-term - systemic effects	64.74 mg/m³	0.324	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.372	

24.3.6. Consumer exposure Air care, instant action (aerosol sprays) (premium grade only) (PC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Inhalation - Long-term - systemic effects	0.1 mg/m³	0.001	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.001	

24.3.7. Consumer exposure Air care, continuous action (solid and liquid) (premium grade only) (PC3)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	0.06 mg/kg bw/day	0.001	{0} EGRET v2
Inhalation - Long-term - systemic effects	0.17 mg/m³	0.001	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.002	

24.3.8. Consumer exposure Washing car window (PC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2

Inhalation - Long-term - systemic effects	0 mg/m³	0	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0	

24.3.9. Consumer exposure Pouring into radiator (PC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	7.13 mg/kg bw/day	0.115	{0} EGRET v2
Inhalation - Long-term - systemic effects	1.84 mg/m³	0.009	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.124	

24.3.10. Consumer exposure Lock de-icer (PC4)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	17.87 mg/kg bw/day	0.288	{0} EGRET v2
Inhalation - Long-term - systemic effects	0.51 mg/m³	0.003	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.291	

24.3.11. Consumer exposure Waterborne latex wall paint (PC9a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	0.04 mg/kg bw/day	0.001	{0} EGRET v2
Inhalation - Long-term - systemic effects	105.3 mg/m³	0.527	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.528	

24.3.12. Consumer exposure Solvent rich, high solid, water borne paint (PC9a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	2.75 mg/kg bw/day	0.044	{0} EGRET v2
Inhalation - Long-term - systemic effects	20.83 mg/m³	0.104	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.148	

24.3.13. Consumer exposure Coatings and paints, thinners, paint removers - Aerosol spray can (PC9a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Inhalation - Long-term - systemic effects	34.29 mg/m³	0.171	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.171	

24.3.14. Consumer exposure Removers (paint-, glue-, wall paper-, sealant-remover) (PC9a)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	10 mg/kg bw/day	0.161	{0} EGRET v2
Inhalation - Long-term - systemic effects	47.65 mg/m³	0.238	{0} EGRET v2

Sum RCR - Long-term - systemic effects		0.399	

24.3.15. Consumer exposure Fillers and putty (PC9b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	0.02 mg/kg bw/day	0	{0} EGRET v2
Inhalation - Long-term - systemic effects	5.37 mg/m³	0.027	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.027	

24.3.16. Consumer exposure Plasters and floor equalizers (PC9b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	0.2 mg/kg bw/day	0.003	{0} EGRET v2
Inhalation - Long-term - systemic effects	133.9 mg/m³	0.67	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.673	

24.3.17. Consumer exposure Modelling clay (PC9b)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	1 mg/kg bw/day	0.016	{0} EGRET v2
Dermal - Long-term - systemic effects	2.54 mg/kg bw/day	0.041	{0} EGRET v2
Inhalation - Long-term - systemic effects	0 mg/m³	0	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.057	

24.3.18. Consumer exposure Finger paints (PC9c)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	6.24 mg/kg bw/day	0.101	{0} EGRET v2
Dermal - Long-term - systemic effects	11.76 mg/kg bw/day	0.19	{0} EGRET v2
Inhalation - Long-term - systemic effects	0 mg/m³	0	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.291	

24.3.19. Consumer exposure Solvent rich, high solid, water borne paint (PC15)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	2.75 mg/kg bw/day	0.044	{0} EGRET v2
Inhalation - Long-term - systemic effects	20.83 mg/m³	0.104	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.148	

24.3.20. Consumer exposure Non-metal-surface treatment products - Aerosol spray can (PC15)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Inhalation - Long-term - systemic effects	34.29 mg/m³	0.171	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.171	

24.3.21. Consumer exposure Removers (paint-, glue-, wall paper-, sealant-remover) (PC15)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	5 mg/kg bw/day	0.081	{0} EGRET v2
Inhalation - Long-term - systemic effects	23.83 mg/m³	0.119	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.2	

24.3.22. Consumer exposure liquids (PC24)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	10 mg/kg bw/day	0.161	{0} EGRET v2
Inhalation - Long-term - systemic effects	0.16 mg/m³	0.001	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.162	

24.3.23. Consumer exposure Pastes (PC24)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	0.62 mg/kg bw/day	0.01	{0} EGRET v2
Inhalation - Long-term - systemic effects	0 mg/m³	0	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.01	

24.3.24. Consumer exposure Lubricants, Greases and Release Products - Sprays (PC24)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	1.43 mg/kg bw/day	0.023	{0} EGRET v2
Inhalation - Long-term - systemic effects	12.29 mg/m³	0.061	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.084	

24.3.25. Consumer exposure Polishes, wax / cream (floor, furniture, shoes) (PC31)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	5 mg/kg bw/day	0.081	{0} EGRET v2
Inhalation - Long-term - systemic effects	25.73 mg/m³	0.129	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.21	

24.3.26. Consumer exposure Polishes, spray (furniture, shoes) (PC31)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	1.43 mg/kg bw/day	0.023	{0} EGRET v2
Inhalation - Long-term - systemic effects	10.92 mg/m³	0.055	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.078	

24.3.27. Consumer exposure Laundry and dish washing products (PC35)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	0.07 mg/kg bw/day	0.001	{0} EGRET v2
Inhalation - Long-term - systemic effects	0.67 mg/m³	0.003	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.004	

24.3.28. Consumer exposure Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	7.15 mg/kg bw/day	0.115	{0} EGRET v2
Inhalation - Long-term - systemic effects	0.84 mg/m³	0.004	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.119	

24.3.29. Consumer exposure Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	10.7 mg/kg bw/day	0.173	{0} EGRET v2
Inhalation - Long-term - systemic effects	1.77 mg/m³	0.009	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.182	

24.3.30. Consumer exposure Welding and soldering products, flux products (PC38)

Route of exposure and type of effects	Exposure estimate	RCR	Method
Oral - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Dermal - Long-term - systemic effects	0 mg/kg bw/day	0	{0} EGRET v2
Inhalation - Long-term - systemic effects	3.76 mg/m³	0.019	{0} EGRET v2
Sum RCR - Long-term - systemic effects		0.019	

24.3.31. Consumer exposure Cosmetics, personal care products (premium grade only) (PC39)

Information for contributing exposure scenario
In accordance to the Article 14 (5b) of the REACH Regulation (EC) No 1907/2006, exposure estimation and risk characterisation for human health does not need to be performed for end uses in cosmetic products within the scope of Directive 76/768/EEC

24.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

24.4.1. Environment

Guidance - Environment	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for environment.

24.4.2. Health

Guidance - Health	No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for consumers