tetrahydrofurfuryl alcohol

Date of first version: 2022-09-27 *Date of print: 2024-05-09*

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

1.1 Product identifier

►	**Product name**	tetrahydrofurfuryl alcohol, tetrahydrodfurfuryl alcohol- stabilized
	Chemical name	tetrahydrofurfuryl alcohol
	Synonyms	Tetrahydro-2furanmethanol; Tetrahydro-2-furancarbinol; Tetrahydro-2-furylmethanol; 2-Hydroxymethyltetrahydrofuran
	Formula	$C_5H_{10}O_2$
	Molecular mass	102.13 g/mol
	CAS-N°.	97-99-4
	EC-N°.	202-625-6
	Registration number	01-2119968921-26-0009

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

Relevant identified uses of the substance or mixture	**Exposure scenario**
Use as an intermediate (	ES 1
Formulation of agrochemicals	ES 2
Use in agrochemicals	ES 3
Formulation of agrochemicals	ES 4
Adhesives, sealants; Resins (prepolymers) -industrial use	ES 5
Adhesives, sealants; Resins (prepolymers) - professional use	ES 6
Use as laboratory reagent	ES 7
Use advised against	
Consumer uses	

1.3 Details of the supplier of the safety data sheet

Manufacturer	International Furan Chemicals B.V
Address	Rotterdam Airportplein 33, 3045 AP Rotterdam, The Netherlands
Telephone number	+31 10 238 05 55
E-mail address	sales@furan.com

1.4 Emergency telephone number

+32(0)14 58 45 45 (24h/24 h)
Information centre on dangerous goods (BIG)) (NL, FR, GB, DE)
Technische Schoolstraat 43 A, B-2440 Geel, Belgium

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

According to Regulation (EC) No.1272/2008 (EU-GHS/CLP)
Hazard Class(es) / Hazard Class and Category Code(s)

Eye irritation	Eye irrit.2, H319
Reproductive Toxicity	Repr. 1B, H360FD

2.2 Label elements

According to Regulation (EC) No.1272/2008 (EU-GHS/CLP)
Hazard pictogram(s)

Signal word Danger
Hazard statement(s)

H319	Causes serious eye irritation
H360FD	May damage fertility. May damage the unborn child.

Precautionary statements

P201	Obtain special instructions before use.
P264	Wash hands thoroughly after handling.
P280	Wear protective gloves/protective clothing/eye protection/face protection
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313	If eye irritation persists: Get medical advice/attention.
P308+P313	IF exposed or concerned: Get medical advice/attention.

2.3 Other hazards

PBT and/or vPvB: no
Endocrine disruptor properties: not identified to have endocrine disrupting properties according to Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 nor is included in the Candidate List of substances of very high concern according to EU REACH Article 59 for having endocrine disrupting properties..

SECTION 3. Composition/information on ingredients

3.1 Substances

Main constituent	Identity		Percentage
tetrahydrofurfuryl alcohol	CAS-N°.	97-99-4	>98 %
	EC N°.	202-625-6	
	Index N°	603-061-00-7	

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation
Remove victim into fresh air. Consult a doctor/medical service if breathing problems develop.

Skin contact
Rinse with water. Soap may be used. Remove contaminated clothes before washing. Consult a doctor/medical service if irritation persists.

Eye contact
First rinse with plenty of water (remove lenses if possible). If eye irritation persists: Get medical advice / attention.
Do not apply neutralizing agents.

Ingestion
Rinse mouth with water. Immediately give lots of water to drink. Never give water to an unconscious person. Do not induce vomiting. Give activated charcoal. Consult a doctor/medical service if you feel unwell.

4.2 Most important symptoms and effects, both acute and delayed

Acute Symptoms and effects
After eye contact: redness of the eye tissue. Irritation.
After ingestion: irritation to mouth, throat and stomach.

Delayed symptoms and effects
Prolonged exposure to vapours may cause central nervous system depression and decreased male fertility Repeated or prolonged dermal contact my cause decreased male fertility.
Inflammation/damage of the eye tissue. Ingestion may cause developmental effects.

4.3 Indication of any immediate medical attention and special treatment needed

After absorption of high quantities:
Gastrointestinal tract irritation, nausea, diarrhoea, dizziness, vomiting,
After exposure to high concentrations:
CNS depression
Dizziness
Vomiting or headaches.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Water, Water spray, Alcohol-resistant foam, BC powder, carbon dioxide.

Unsuitable extinguishing media

No data available.

5.2 Special hazards arising from the substance

Hazardous combustion product

Material presenting a fire hazard. On burning: CO and CO_2 can be formed.

Additional hazards

Not applicable.

5.3 Advice for firefighters

Protective actions

Cool tanks/drums with water spray/remove them into safety.

Special protective equipment

Eye/face protection.
Protective clothing for exposure to chemicals.
Self contained breathing apparatus.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

High gas/vapour concentration: compressed air/oxygen apparatus.
Gas mask with filter type A.
Gloves.
Protective goggles.
Head/skin protection.
Heatproof clothing .

6.2 Environmental precautions

Contain released substance, pump over in suitable containers.
Plug the lead, cut off the supply.

6.3 Methods and material for containment and cleaning up

Advice on spillage containment

Take up liquid spill into a non combustible material e.g.: dry sand/earth/vermiculite or kieselguhr.
Scoop absorbed substance into closing containers.

Appropriate clean up procedures

Clean contaminates surfaces with an excess of water.
Wash clothing and equipment after handling.

Inappropriate containment or clean-up techniques

None known/

6.4 Reference to other sections

See also the sections 8 and 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Recommendations for safe handling

Observe label precautions.
Use only with adequate ventilation.
Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Wear appropriate respirator when ventilation is inadequate. Use earthed equipment.
Remove contaminated clothing immediately.

Clean contaminated clothing.

Advice on occupational hygiene

Do not eat drink or smoke in work areas.

7.2 Conditions for safe storage, including any incompatibilities

Protection against incompatible substances

Keep container tightly closed.
Ventilation at floor level.
Keep away from: heat sources, oxidizing agents, acids, ignition sources.
Materials for packaging: steel aluminium, glass, polypropylene.
Material for packaging to avoid: no information available.

Protection against ambient influences

Store in a cool and well ventilated area.
Recommended storage temperature: 20 ºC.

Maintenance of the integrity of the substance

Not required.

7.3 Specific end use(s)

See information supplied by the manufacturer.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

No control parameters available.

DNEL	DNEL $_{worker}$ (long term, inhalation - systemic)	DNEL = 1.4mg/m³
	DNEL $_{worker}$ (long term, dermal, systemic)	DNEL = 1 mg/kg bw/day
PNEC		
Aquatic		
Fresh water	PNEC $_{aquatic}$ (freshwater)	PNEC=1.9mg/l
Marine water	PNEC $_{aquatic}$ (marine water)	PNEC=0.19mg/l
Intermittent release	PNEC $_{aquatic}$ (intermittent release)	PNEC=0.917 mg/l
STP	PNEC stp	PNEC=10mg/l
Sedimentary		
Fresh water sediment	PNEC $_{sediment}$	PNEC= 8.6mg/kg sediment dw
Marine water sediment	PNEC $_{marine\text{-}sediment}$	PNEC= 0.86mg/kg sediment dw
Terrestrial		
Soil	PNEC $_{soil}$	PNEC =0.6 mg/kg soil dw
Secondary Poisoning		
Food chain	No potential for bioaccumulation.	

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Ventilation and local exhaust.
Measure the concentration in the air regularly.

8.2.2 Individual protection measures, such as personal protective

a) Eye/face protection

Face shield.(EN 166)

b) Skin protection

Hand protection

Chemical resistant gloves
butyl rubber, break through time > 480min, 0.7mm (EN 374)
neoprene, break through time > 480 min, 0.4 mm (EN 374)

Body protection

Protective clothing.

c) Respiratory protection

In case of insufficient local exhaust: High gas/vapour concentration: gas mask with filter type A. (EN 14387)

d) Thermal hazards

Not applicable.

8.2.3 Environmental exposure controls

Direct polluted air of the local exhaust ventilation out of the plant in a manner in accordance with environmental regulations.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	Liquid
Colour	Colourless to Light-yellow
Odour	Characteristic
Melting point/freezing point	< -120°C
Boiling point or initial boiling point and boiling range	178°C
Flammability	N.D.
Lower and upper explosion limit	1.5%-9.7%
Flashpoint	73 °C (closed cup)
Auto-ignition temperature	282°C
Decomposition Temperature (°C)	N.D.
► **pH value**	3-5 (25wt% in water) (non-stabilized); 9-11 (25wt% in water) (stabilized)
Kinematic viscosity	5.94 mm²/s
Solubility	Water :Completely, 250g/L; Ethanol, ether, chloroform, methanol, 1-propanol, iso-amylalcohol, ethylacetate
Partition coefficient n-octanol/water (log value)	-0.14 (Log Pow)
Vapour pressure (at 25°C)	1.42 hPa
Density and/or relative density	1.05
Relative vapour density	3.4
Particle characteristics	Not applicable

9.2 Other information

9.2.1 Information with regard to physical hazard classes

Not classified

9.2.2 Other safety characteristics

Saturation concentration	1.3g/m³

SECTION 10: Stability and Reactivity

10.1 Reactivity

Not reactive.

10.2 Chemical stability

Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

Reactive with oxidizing agents.

10.4 Conditions to avoid

Keep away from: heat sources, oxidizing agents, acids and sources of ignition .
Keep containers tightly closed.

10.5 Incompatible materials

Reactive with oxidizing agents.

10.6 Hazardous decomposition products

Upon decomposition emits carbon monoxide, carbon dioxide..

SECTION 11: Toxicological information

11.1	**Information on hazard classes as defined in Regulation (EC) No 1272/2008**	
a)	**Acute toxicity**	
	LD50 (oral, rat) (mg/kg)	>2000
	LD50 (dermal, rat) (mg/kg)	>2000
	LC50 (inhalation, rat, 4 hours) (mg/l)	> 3.1
b)	**Skin corrosion/irritation**	Not irritating to skin
c)	**Serious eye damage/irritation**	Irritating to eyes
d)	**Respiratory or skin sensitization**	Considered to be a non sensitizer
e)	**Germ cell mutagenicity**	Considered non genotoxic in vitro.
f)	**Carcinogenicity**	No information available
g)	**Reproductive toxicity**	Suspected of damaging fertility or the unborn child for reproductive toxicity. Specific effect: Males: lower prostate, epididymal and testes weights, necrosis of the seminiferous tubular epithelium and lower sperm production. Females: prolonged oestrus cycle and gestation length. Foetal resorption or mummification and dead pups on PND 1. Route of exposure: Oral
h)	**STOT single exposure**	No information available
i)	**STOT- repeated exposure**	No information available
j)	**Aspiration hazard**	No information available

11.2 Information on other hazards

11.2.1 Endocrine disrupting properties

No endocrine disrupting properties identified.

11.2.2 Other information

Not applicable.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic compartment and sediment	
LC50 (Oryzias latipes) (mg/l)	>101
EC50 (bacteria, 15min) (mg/l)	1600
EC50 (Daphnia Magna, 48 hours) (mg/l)	>91.7
EC50 (Pseudokirchnerella subcaptitata 72 hours static) (mg/l)	>98.9

12.2 Persistence and degradability

Biodegradability Readily biodegradable in water, sludge and soil.

12.3 Bioaccumulative potential

Bioaccumulative potential Slightly or not bio-accumulative

Partition coefficient: n-octanol water (conc in organisms / conc. in water) -0.14

12.4 Mobility in soil

Adsorption coefficient (Koc) solid phase / liquid phase	N.D.

12.5 Results of PBT and vPvB assessment PBT and/or vPvB: no

12.6 Endocrine disrupting properties
Adverse environmental effects of endocrine disruptors are not relevant (see subsection 2.3)

12.7 Other adverse effects

Effect on the Ozone layer	Not dangerous for the ozone layer (Council Regulation (EC) No 2037/2000 O.J. L244 of 29/09/2000)
Water hazard class (WGK Germany)	3

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Substance	Recycling by distillation. Removal to an authorized waste incinerator for solvents. Obtain the consent of pollution control authorities before discharging to wastewater treatment plant. or as chemical waste in accordance with local regulations. Do not discharge into surface water.
European waste list (EURAL)	07 01 04* (other organic solvents, washing liquids and mother liquors)
LWCA(The Netherlands)	KGA category 03
Packaging/container	15 01 10* (packaging containing residues of or contaminated by dangerous substances)

SECTION 14: Transport information

Not classified as dangerous good under transport regulations.

14.1 UN Number or ID number	Not regulated
14.2 UN proper shipping name	Not applicable
14.3 Transport hazard class(es) code	Not applicable
14.4 Packing group	Not applicable
14.5 Environmental hazards	Not applicable
14.6 Specials precautions for user	Not applicable

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

Regulation (EC) 1907/2006 on the Registration, Evaluation, Authorisation and Restriction of Chemicals and amendments. EU Regulation (EC) No. 1907/2006 (Reach) Annex XVII, Restrictions on the manufacturing, placing on the market, and use of dangerous substances, mixtures and article: Entry 3; 28, 29 and 30(restricted to industrial/professional users and not supplied to the general public) applicable
Regulation (EC) 1272/2008 on classification, labelling and packaging of substances and mixtures and amendments.
Refer to the relevant EU/national regulation for details of any actions or restrictions required by the above Regulation(s).

15.2 Chemical safety assessment

A chemical safety assessment has been carried out on the substance.

SECTION 16: OTHER INFORMATION

16.1 Changes to the previous version.

Update of pH value and addition of name in section 1
►Indicates changes in content from previously issued version.
Date of revision: 07-05-2024
Version: 002
Date of previous version: 27-09-2022

16.2. Abbreviations and acronyms

EC50	Effect Concentration, 50 percent
GHS / CLP	Globally Harmonised System / Classification, Labelling and Packaging
LC50	Lethal Concentration, 50 percent
LD50	Lethal Dose, 50 percent
N.D.	Not Determined
PBT	Persistent, Bioaccumulative and Toxic
vPvB	very Persistent and very Bioaccumulative

16.3 Relevant hazard statements not written out in full in section 2-15

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EXPOSURE SCENARIO FOR COMMUNICATION

Table of Contents

1. ES 1: Use at industrial sites; Various sectors (SU 8, SU 9)

1.1. Title section

ES name: *Use as intermediate*
Sector of use: Manufacture of bulk, large scale chemicals (including petroleum products) (SU 8), Manufacture of fine chemicals (SU 9)

Environment		SPERC
1: *Use as intermediate*	ERC 6a	*ESVOC 6.1a.v1*
Worker		SWED
2: *General exposures, closed systems*	PROC 1	
3: *General exposures, closed systems*	PROC 2	
4: *General exposures, closed systems*	PROC 3	
5: *General exposures, open systems*	PROC 4	
6: *Process sampling*	PROC 9	
7: *Laboratory activities*	PROC 15	
8: *Bulk transfers, Closed systems*	PROC 8b	
9: *Bulk transfers, open systems*	PROC 8b	
10: *Bulk transfers, Open systems*	PROC 8b	
11: *Equipment cleaning and maintenance*	PROC 8a, PROC 28	
12: *Storage*	PROC 1	
13: *Storage*	PROC 2	

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: *Use as intermediate* (ERC 6a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 2 tonnes/day
Annual amount per site <= 40 tonnes/year
Technical and organisational conditions and measures
Typical measures to maintain workplace concentrations or airborne VOCs and particulates below respective OELS
Upgrade of the system in place or additional air treatment measures
No release to wastewater from process as such, wastewater emissions limited to release generated from final equipment cleaning step using water
acclimated biological treatment
Indoor use
Process optimized for highly efficient use of raw materials (very minimal environmental release).
Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Assumed domestic sewage treatment plant flow >= 2E3 m3/day
Conditions and measures related to external treatment of waste (including article waste)
No waste from process

1.2.2. Control of worker exposure: *General exposures, closed systems* (PROC 1)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.3. Control of worker exposure: *General exposures, closed systems* (PROC 2)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.4. Control of worker exposure: *General exposures, closed systems* (PROC 3)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 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).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.5. Control of worker exposure: *General exposures, open systems* (PROC 4)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 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).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.6. Control of worker exposure: *Process sampling* (PROC 9)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 0.25 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).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure

Indoor use
Assumes process temperature up to 40 °C

1.2.7. Control of worker exposure: *Laboratory activities* (PROC 15)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.8. Control of worker exposure: *Bulk transfers, Closed systems* (PROC 8b)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 95 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.9. Control of worker exposure: *Bulk transfers, open systems* (PROC 8b)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures

Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 95 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.10. Control of worker exposure: *Bulk transfers, Open systems* (PROC 8b)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 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).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.11. Control of worker exposure: *Equipment cleaning and maintenance* (PROC 8a, PROC 28)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer

to section 8 of the SDS.
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.12. Control of worker exposure: *Storage* (PROC 1)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.13. Control of worker exposure: *Storage* (PROC 2)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 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).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure: *Use as intermediate* (ERC 6a)

Release route	Release rate	Release estimation method
Water	20 kg/day	SPERC

Release route	Release rate	Release estimation method
Air	2 kg/day	SPERC
Soil	2 kg/day	SPERC

Protection target	Exposure estimate	RCR
Fresh water	0.127 mg/L (EUSES 2.1.2)	0.067
Sediment (freshwater)	0.569 mg/kg dw (EUSES 2.1.2)	0.066
Marine water	0.013 mg/L (EUSES 2.1.2)	0.067
Sediment (marine water)	0.057 mg/kg dw (EUSES 2.1.2)	0.066
Sewage Treatment Plant	1.264 mg/L (EUSES 2.1.2)	0.126
Agricultural soil	0.023 mg/kg dw (EUSES 2.1.2)	0.038
Man via environment - Inhalation (systemic effects)	3.35E-5 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	7.43E-4 mg/kg bw/day (EUSES 2.1.2)	< 0.01
Man via environment - combined routes		< 0.01

1.3.2. Worker exposure: *General exposures, closed systems* (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.043 mg/m³ (TRA Workers 3.0)	0.03
Dermal, systemic, long term	0.034 mg/kg bw/day (TRA Workers 3.0)	0.034
Combined, systemic, long term		0.064

1.3.3. Worker exposure: *General exposures, closed systems* (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304
Dermal, systemic, long term	0.027 mg/kg bw/day (TRA Workers 3.0)	0.027
Combined, systemic, long term		0.331

1.3.4. Worker exposure: *General exposures, closed systems* (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.893 mg/m³ (TRA Workers 3.0)	0.638
Dermal, systemic, long term	0.014 mg/kg bw/day (TRA Workers 3.0)	0.014
Combined, systemic, long term		0.652

1.3.5. Worker exposure: *General exposures, open systems* (PROC 4)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.893 mg/m³ (TRA Workers 3.0)	0.638
Dermal, systemic, long term	0.137 mg/kg bw/day (TRA Workers 3.0)	0.137
Combined, systemic, long term		0.775

1.3.6. Worker exposure: *Process sampling* (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.015 mg/m³ (TRA Workers 3.0)	0.011
Dermal, systemic, long term	0.069 mg/kg bw/day (TRA Workers 3.0)	0.069
Combined, systemic, long term		0.079

1.3.7. Worker exposure: *Laboratory activities* (PROC 15)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304
Dermal, systemic, long term	6.8E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.311

1.3.8. Worker exposure: *Bulk transfers, Closed systems* (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.064 mg/m³ (TRA Workers 3.0)	0.76
Dermal, systemic, long term	0.137 mg/kg bw/day (TRA Workers 3.0)	0.137
Combined, systemic, long term		0.897

1.3.9. Worker exposure: *Bulk transfers, open systems* (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.638 mg/m³ (TRA Workers 3.0)	0.456
Dermal, systemic, long term	0.137 mg/kg bw/day (TRA Workers 3.0)	0.137
Combined, systemic, long term		0.593

1.3.10. Worker exposure: *Bulk transfers, Open systems* (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.298 mg/m³ (TRA Workers 3.0)	0.213
Dermal, systemic, long term	0.686 mg/kg bw/day (TRA Workers 3.0)	0.686
Combined, systemic, long term		0.898

1.3.11. Worker exposure: *Equipment cleaning and maintenance* (PROC 8a, PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304
Dermal, systemic, long term	0.274 mg/kg bw/day (TRA Workers 3.0)	0.274
Combined, systemic, long term		0.578

1.3.12. Worker exposure: *Storage* (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.043 mg/m³ (TRA Workers 3.0)	0.03
Dermal, systemic, long term	0.034 mg/kg bw/day (TRA Workers 3.0)	0.034
Combined, systemic, long term		0.064

1.3.13. Worker exposure: *Storage* (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.596 mg/m³ (TRA Workers 3.0)	0.425
Dermal, systemic, long term	0.274 mg/kg bw/day (TRA Workers 3.0)	0.274
Combined, systemic, long term		0.699

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

Guidance: The workers exposure and environmental emissions have been evaluated using EUSES (2.1.2), TRA Worker (v3). Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

2. ES 2: Formulation or re-packing; Various products (PC 12, PC 27)

2.1. Title section

ES name: *Use in agrochemicals*
Product category: Fertilizers (PC 12), Plant Protection Products (PC 27)

Environment		SPERC
1: *Use in agrochemicals*	ERC 2	*ESVOC 2.2.v1*
Worker		SWED
2: *General exposures; Closed systems*	PROC 1	
3: *General exposures; Closed systems*	PROC 2	
4: *General exposures; Closed systems*	PROC 3	
5: *General exposures; Open systems*	PROC 4	
6: *Batch process; Elevated temperature; Use in contained systems*	PROC 3	
7: *Process sampling*	PROC 9	
8: *Laboratory activities*	PROC 15	
9: *Bulk transfers; Dedicated facility*	PROC 8b	
10: *Mixing operations; Open systems*	PROC 5	
11: *Manual; Transfer from/pouring from containers; Non-dedicated facility*	PROC 8a	
12: *Drum/batch transfers; Dedicated facility*	PROC 8b	
13: *Tabletting, compression, extrusion or pelletisation*	PROC 14	
14: *Drum and small package filling*	PROC 9	
15: *Equipment cleaning and maintenance*	PROC 8a, PROC 28	
16: *Storage*	PROC 1	
17: *Storage*	PROC 2	

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: *Use in agrochemicals* (ERC 2)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 4.2 tonnes/day
Annual amount per site <= 425 tonnes/year
Technical and organisational conditions and measures
Typical measures to maintain workplace concentrations or airborne VOCs and particulates below respective OELS
No release to wastewater from process as such, wastewater emissions limited to release generated from final equipment cleaning step using water
Process optimized for highly efficient use of raw materials (very minimal environmental release).
Conditions and measures related to biological sewage treatment plant
Assumed domestic sewage treatment plant flow >= 2E3 m3/day
Municipal sewage treatment plant is assumed.
Conditions and measures related to external treatment of waste (including article waste)
No waste from process

2.2.2. Control of worker exposure: *General exposures; Closed systems* (PROC 1)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.3. Control of worker exposure: *General exposures; Closed systems* (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.4. Control of worker exposure: *General exposures; Closed systems* (PROC 3)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.5. Control of worker exposure: *General exposures; Open systems* (PROC 4)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.6. Control of worker exposure: *Batch process; Elevated temperature; Use in contained systems* (PROC 3)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 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).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use

Assumes process temperature up to 80 °C

2.2.7. Control of worker exposure: *Process sampling* (PROC 9)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 0.25 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).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.8. Control of worker exposure: *Laboratory activities* (PROC 15)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.9. Control of worker exposure: *Bulk transfers; Dedicated facility* (PROC 8b)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 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).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 95 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.10. Control of worker exposure: *Mixing operations; Open systems* (PROC 5)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.11. Control of worker exposure: *Manual; Transfer from/pouring from containers; Non-dedicated facility* (PROC 8a)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.12. Control of worker exposure: *Drum/batch transfers; Dedicated facility* (PROC 8b)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 95 %
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.13. Control of worker exposure: *Tabletting, compression, extrusion or pelletisation* (PROC 14)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure

Indoor use
Assumes process temperature up to 40 °C

2.2.14. Control of worker exposure: *Drum and small package filling* (PROC 9)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.15. Control of worker exposure: *Equipment cleaning and maintenance* (PROC 8a, PROC 28)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.16. Control of worker exposure: *Storage* (PROC 1)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.17. Control of worker exposure: *Storage* (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure: *Use in agrochemicals* (ERC 2)

Release route	Release rate	Release estimation method
Water	21 kg/day	SPERC
Air	42 kg/day	SPERC
Soil	0.42 kg/day	SPERC

Protection target	Exposure estimate	RCR
Fresh water	0.133 mg/L (EUSES 2.1.2)	0.07
Sediment (freshwater)	0.597 mg/kg dw (EUSES 2.1.2)	0.069
Marine water	0.013 mg/L (EUSES 2.1.2)	0.07
Sediment (marine water)	0.06 mg/kg dw (EUSES 2.1.2)	0.069
Sewage Treatment Plant	1.328 mg/L (EUSES 2.1.2)	0.133

Protection target	Exposure estimate	RCR
Agricultural soil	0.024 mg/kg dw (EUSES 2.1.2)	0.04
Man via environment - Inhalation (systemic effects)	3.24E-3 mg/m³ (EUSES 2.1.2)	0.013
Man via environment - Oral	6E-3 mg/kg bw/day (EUSES 2.1.2)	0.034
Man via environment - combined routes		0.047

2.3.2. Worker exposure: *General exposures; Closed systems* (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.026 mg/m³ (TRA Workers 3.0)	0.018
Dermal, systemic, long term	0.02 mg/kg bw/day (TRA Workers 3.0)	0.02
Combined, systemic, long term		0.039

2.3.3. Worker exposure: *General exposures; Closed systems* (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.255 mg/m³ (TRA Workers 3.0)	0.182
Dermal, systemic, long term	0.016 mg/kg bw/day (TRA Workers 3.0)	0.016
Combined, systemic, long term		0.199

2.3.4. Worker exposure: *General exposures; Closed systems* (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.766 mg/m³ (TRA Workers 3.0)	0.547
Dermal, systemic, long term	8.28E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.555

2.3.5. Worker exposure: *General exposures; Open systems* (PROC 4)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.766 mg/m³ (TRA Workers 3.0)	0.547
Dermal, systemic, long term	0.082 mg/kg bw/day (TRA Workers 3.0)	0.082
Combined, systemic, long term		0.629

2.3.6. Worker exposure: *Batch process; Elevated temperature; Use in contained systems* (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.072 mg/m³ (TRA Workers 3.0)	0.766
Dermal, systemic, long term	4.97E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.771

2.3.7. Worker exposure: *Process sampling* (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.089 mg/m³ (TRA Workers 3.0)	0.064
Dermal, systemic, long term	0.823 mg/kg bw/day (TRA Workers 3.0)	0.823
Combined, systemic, long term		0.887

2.3.8. Worker exposure: *Laboratory activities* (PROC 15)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.276 mg/m³ (TRA Workers 3.0)	0.912

Route of exposure and type of effects	Exposure estimate	RCR
Dermal, systemic, long term	4.08E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.916

2.3.9. Worker exposure: *Bulk transfers; Dedicated facility* (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.149 mg/m³ (TRA Workers 3.0)	0.106
Dermal, systemic, long term	0.137 mg/kg bw/day (TRA Workers 3.0)	0.137
Combined, systemic, long term		0.243

2.3.10. Worker exposure: *Mixing operations; Open systems* (PROC 5)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.766 mg/m³ (TRA Workers 3.0)	0.547
Dermal, systemic, long term	0.165 mg/kg bw/day (TRA Workers 3.0)	0.165
Combined, systemic, long term		0.711

2.3.11. Worker exposure: *Manual; Transfer from/pouring from containers; Non-dedicated facility* (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.255 mg/m³ (TRA Workers 3.0)	0.182
Dermal, systemic, long term	0.274 mg/kg bw/day (TRA Workers 3.0)	0.274
Combined, systemic, long term		0.457

2.3.12. Worker exposure: *Drum/batch transfers; Dedicated facility* (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.638 mg/m³ (TRA Workers 3.0)	0.456
Dermal, systemic, long term	0.137 mg/kg bw/day (TRA Workers 3.0)	0.137
Combined, systemic, long term		0.593

2.3.13. Worker exposure: *Tabletting, compression, extrusion or pelletisation* (PROC 14)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.276 mg/m³ (TRA Workers 3.0)	0.912
Dermal, systemic, long term	0.041 mg/kg bw/day (TRA Workers 3.0)	0.041
Combined, systemic, long term		0.953

2.3.14. Worker exposure: *Drum and small package filling* (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.276 mg/m³ (TRA Workers 3.0)	0.912
Dermal, systemic, long term	0.041 mg/kg bw/day (TRA Workers 3.0)	0.041
Combined, systemic, long term		0.953

2.3.15. Worker exposure: *Equipment cleaning and maintenance* (PROC 8a, PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.255 mg/m³ (TRA Workers 3.0)	0.182

Route of exposure and type of effects	Exposure estimate	RCR
Dermal, systemic, long term	0.274 mg/kg bw/day (TRA Workers 3.0)	0.274
Combined, systemic, long term		0.457

2.3.16. Worker exposure: *Storage* (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.026 mg/m³ (TRA Workers 3.0)	0.018
Dermal, systemic, long term	0.02 mg/kg bw/day (TRA Workers 3.0)	0.02
Combined, systemic, long term		0.039

2.3.17. Worker exposure: *Storage* (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.51 mg/m³ (TRA Workers 3.0)	0.365
Dermal, systemic, long term	0.164 mg/kg bw/day (TRA Workers 3.0)	0.164
Combined, systemic, long term		0.529

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

Guidance: The workers exposure and environmental emissions have been evaluated using EUSES (2.1.2), TRA Worker (v3). Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

3. ES 3: Widespread use by professional workers; Various products (PC 12, PC 27); Agriculture, forestry, fishery (SU 1)

3.1. Title section

ES name: *Use in agrochemicals*
Product category: Fertilizers (PC 12), Plant Protection Products (PC 27)
Sector of use: Agriculture, forestry, fishery (SU 1)

Environment	
1: *Use in agrochemicals*	ERC 8d, ERC 8a
Worker	
2: *Transfer from/pouring from containers; Dedicated facility*	PROC 8b
3: *Mixing operations; Open systems*	PROC 4
4: *Spraying or fogging; Manual*	PROC 11
5: *Spraying or fogging; Tractor delivery/dispersal*	PROC 11
6: *Ad hoc manual application via trigger sprays, dipping, etc.*	PROC 13
7: *Equipment cleaning and maintenance*	PROC 8a, PROC 28
8: *Storage*	PROC 1
9: *Storage*	PROC 2

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: *Use in agrochemicals* (ERC 8d, ERC 8a)

Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.

3.2.2. Control of worker exposure: *Transfer from/pouring from containers; Dedicated facility* (PROC 8b)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 0.25 h/day
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

3.2.3. Control of worker exposure: *Mixing operations; Open systems* (PROC 4)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

3.2.4. Control of worker exposure: *Spraying or fogging; Manual* (PROC 11)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 95 %; For further specification, refer to section 8 of the SDS.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

3.2.5. Control of worker exposure: *Spraying or fogging; Tractor delivery/dispersal* (PROC 11)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Outdoor use

Assumes process temperature up to 40 °C

3.2.6. Control of worker exposure: *Ad hoc manual application via trigger sprays, dipping, etc.* (PROC 13)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 0.5 h/day
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

3.2.7. Control of worker exposure: *Equipment cleaning and maintenance* (PROC 8a, PROC 28)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 0.25 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Local exhaust ventilation; Inhalation - minimum efficiency of 80 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

3.2.8. Control of worker exposure: *Storage* (PROC 1)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures

Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

3.2.9. Control of worker exposure: *Storage* (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 0.25 h/day
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure: *Use in agrochemicals* (ERC 8d)

Release route	Release rate	Release estimation method
Water	95 kg/day	ERC
Air	95 kg/day	ERC
Soil	19 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	0.601 mg/L (EUSES 2.1.2)	0.316
Sediment (freshwater)	2.696 mg/kg dw (EUSES 2.1.2)	0.313
Marine water	0.06 mg/L (EUSES 2.1.2)	0.316
Sediment (marine water)	0.27 mg/kg dw (EUSES 2.1.2)	0.313
Sewage Treatment Plant	6.006 mg/L (EUSES 2.1.2)	0.601
Agricultural soil	0.107 mg/kg dw (EUSES 2.1.2)	0.179
Man via environment - Inhalation (systemic effects)	5.99E-6 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	0.019 mg/kg bw/day (EUSES 2.1.2)	0.109
Man via environment - combined routes		0.109

3.3.2. Worker exposure: *Transfer from/pouring from containers; Dedicated facility* (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.179 mg/m³ (TRA Workers 3.0)	0.128
Dermal, systemic, long term	0.823 mg/kg bw/day (TRA Workers 3.0)	0.823
Combined, systemic, long term		0.95

3.3.3. Worker exposure: *Mixing operations; Open systems* (PROC 4)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.357 mg/m³ (TRA Workers 3.0)	0.255
Dermal, systemic, long term	0.412 mg/kg bw/day (TRA Workers 3.0)	0.412
Combined, systemic, long term		0.667

3.3.4. Worker exposure: *Spraying or fogging; Manual* (PROC 11)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.55 mg/m³ (ART)	0.393
Dermal, systemic, long term	0.246 mg/kg bw/day (The German Model (BBA))	0.246
Combined, systemic, long term		0.639

3.3.5. Worker exposure: *Spraying or fogging; Tractor delivery/dispersal* (PROC 11)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.3 mg/m³ (ART)	0.214
Dermal, systemic, long term	0.337 mg/kg bw/day (The German Model (BBA))	0.337
Combined, systemic, long term		0.551

3.3.6. Worker exposure: *Ad hoc manual application via trigger sprays, dipping, etc.* (PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.357 mg/m³ (TRA Workers 3.0)	0.255
Dermal, systemic, long term	0.58 mg/kg bw/day (ConExpo Web)	0.58
Combined, systemic, long term		0.835

3.3.7. Worker exposure: *Equipment cleaning and maintenance* (PROC 8a, PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.128 mg/m³ (TRA Workers 3.0)	0.091
Dermal, systemic, long term	0.165 mg/kg bw/day (TRA Workers 3.0)	0.165
Combined, systemic, long term		0.256

3.3.8. Worker exposure: *Storage* (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.043 mg/m³ (TRA Workers 3.0)	0.03
Dermal, systemic, long term	0.034 mg/kg bw/day (TRA Workers 3.0)	0.034
Combined, systemic, long term		0.064

3.3.9. Worker exposure: *Storage* (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.893 mg/m³ (TRA Workers 3.0)	0.638
Dermal, systemic, long term	0.164 mg/kg bw/day (TRA Workers 3.0)	0.164
Combined, systemic, long term		0.803

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

Guidance: The workers exposure and environmental emissions have been evaluated using EUSES (2.1.2), TRA Worker (v3), Consexpo (WEB 1.0.1), German mode and ART.1.5. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

4. ES 4: Formulation or re-packing; Adhesives, Sealants (PC 1)

4.1. Title section

ES name: *Adhesives, sealants, Resins (prepolymers)*
Product category: Adhesives, Sealants (PC 1)

Environment		SPERC
1: *Adhesives, sealants, Resins (prepolymers)*	ERC 2	*ESVOC 2.2.v1*
Worker		SWED
2: *General exposures; Closed systems*	PROC 1	
3: *General exposures; Closed systems*	PROC 2	
4: *General exposures; Closed systems*	PROC 3	
5: *General exposures; Open systems*	PROC 4	
6: *Batch process; Elevated temperature; Use in contained systems*	PROC 3	
7: *Process sampling*	PROC 9	
8: *Laboratory activities*	PROC 15	
9: *Bulk transfers; Dedicated facility*	PROC 8b	
10: *Mixing operations; Open systems*	PROC 5	
11: *Manual; Transfer from/pouring from containers; Non-dedicated facility*	PROC 8a	
12: *Drum/batch transfers; Dedicated facility*	PROC 8b	
13: *Tabletting, compression, extrusion or pelletisation*	PROC 14	
14: *Drum and small package filling*	PROC 9	
15: *Equipment cleaning and maintenance*	PROC 8a, PROC 28	
16: *Storage*	PROC 1	
17: *Storage*	PROC 2	

4.2. Conditions of use affecting exposure

4.2.1. Control of environmental exposure: *Adhesives, sealants, Resins (prepolymers)* (ERC 2)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 2 tonnes/day
Annual amount per site <= 20 tonnes/year
Technical and organisational conditions and measures
Typical measures to maintain workplace concentrations or airborne VOCs and particulates below respective OELS
No release to wastewater from process as such, wastewater emissions limited to release generated from final equipment cleaning step using water
Process optimized for highly efficient use of raw materials (very minimal environmental release).
Conditions and measures related to biological sewage treatment plant
Assumed domestic sewage treatment plant flow >= 2E3 m3/day
Municipal sewage treatment plant is assumed.

4.2.2. Control of worker exposure: *General exposures; Closed systems* (PROC 1)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.3. Control of worker exposure: *General exposures; Closed systems* (PROC 2)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.4. Control of worker exposure: *General exposures; Closed systems* (PROC 3)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.5. Control of worker exposure: *General exposures; Open systems* (PROC 4)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.6. Control of worker exposure: *Batch process; Elevated temperature; Use in contained systems* (PROC 3)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 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).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use

Assumes process temperature up to 80 °C

4.2.7. Control of worker exposure: *Process sampling* (PROC 9)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 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).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.8. Control of worker exposure: *Laboratory activities* (PROC 15)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.9. Control of worker exposure: *Bulk transfers; Dedicated facility* (PROC 8b)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 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).

Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 95 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.10. Control of worker exposure: *Mixing operations; Open systems* (PROC 5)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.11. Control of worker exposure: *Manual; Transfer from/pouring from containers; Non-dedicated facility* (PROC 8a)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.

Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.12. Control of worker exposure: *Drum/batch transfers; Dedicated facility* (PROC 8b)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 95 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.13. Control of worker exposure: *Tabletting, compression, extrusion or pelletisation* (PROC 14)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use

Assumes process temperature up to 40 °C

4.2.14. Control of worker exposure: *Drum and small package filling* (PROC 9)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.15. Control of worker exposure: *Equipment cleaning and maintenance* (PROC 8a, PROC 28)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.16. Control of worker exposure: *Storage* (PROC 1)

Product (article) characteristics

Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.17. Control of worker exposure: *Storage* (PROC 2)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.3. Exposure estimation and reference to its source

4.3.1. Environmental release and exposure: *Adhesives, sealants, Resins (prepolymers)* (ERC 2)

Release route	Release rate	Release estimation method
Water	10 kg/day	SPERC
Air	20 kg/day	SPERC
Soil	0.2 kg/day	SPERC

Protection target	Exposure estimate	RCR
Fresh water	0.064 mg/L (EUSES 2.1.2)	0.033
Sediment (freshwater)	0.285 mg/kg dw (EUSES 2.1.2)	0.033
Marine water	6.36E-3 mg/L (EUSES 2.1.2)	0.033
Sediment (marine water)	0.029 mg/kg dw (EUSES 2.1.2)	0.033
Sewage Treatment Plant	0.632 mg/L (EUSES 2.1.2)	0.063

Protection target	Exposure estimate	RCR
Agricultural soil	0.011 mg/kg dw (EUSES 2.1.2)	0.019
Man via environment - Inhalation (systemic effects)	1.55E-4 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	5.78E-4 mg/kg bw/day (EUSES 2.1.2)	< 0.01
Man via environment - combined routes		< 0.01

4.3.2. Worker exposure: *General exposures; Closed systems* (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	8.51E-3 mg/m³ (TRA Workers 3.0)	< 0.01
Dermal, systemic, long term	6.8E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.013

4.3.3. Worker exposure: *General exposures; Closed systems* (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.085 mg/m³ (TRA Workers 3.0)	0.061
Dermal, systemic, long term	5.48E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.066

4.3.4. Worker exposure: *General exposures; Closed systems* (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.255 mg/m³ (TRA Workers 3.0)	0.182
Dermal, systemic, long term	2.76E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.185

4.3.5. Worker exposure: *General exposures; Open systems* (PROC 4)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.255 mg/m³ (TRA Workers 3.0)	0.182
Dermal, systemic, long term	0.027 mg/kg bw/day (TRA Workers 3.0)	0.027
Combined, systemic, long term		0.21

4.3.6. Worker exposure: *Batch process; Elevated temperature; Use in contained systems* (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.596 mg/m³ (TRA Workers 3.0)	0.425
Dermal, systemic, long term	2.76E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.428

4.3.7. Worker exposure: *Process sampling* (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.596 mg/m³ (TRA Workers 3.0)	0.425
Dermal, systemic, long term	0.274 mg/kg bw/day (TRA Workers 3.0)	0.274
Combined, systemic, long term		0.7

4.3.8. Worker exposure: *Laboratory activities* (PROC 15)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304

Route of exposure and type of effects	Exposure estimate	RCR
Dermal, systemic, long term	1.36E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.305

4.3.9. Worker exposure: *Bulk transfers; Dedicated facility* (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.149 mg/m³ (TRA Workers 3.0)	0.106
Dermal, systemic, long term	0.137 mg/kg bw/day (TRA Workers 3.0)	0.137
Combined, systemic, long term		0.243

4.3.10. Worker exposure: *Mixing operations; Open systems* (PROC 5)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.255 mg/m³ (TRA Workers 3.0)	0.182
Dermal, systemic, long term	0.055 mg/kg bw/day (TRA Workers 3.0)	0.055
Combined, systemic, long term		0.237

4.3.11. Worker exposure: *Manual; Transfer from/pouring from containers; Non-dedicated facility* (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.255 mg/m³ (TRA Workers 3.0)	0.182
Dermal, systemic, long term	0.274 mg/kg bw/day (TRA Workers 3.0)	0.274
Combined, systemic, long term		0.457

4.3.12. Worker exposure: *Drum/batch transfers; Dedicated facility* (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.638 mg/m³ (TRA Workers 3.0)	0.456
Dermal, systemic, long term	0.137 mg/kg bw/day (TRA Workers 3.0)	0.137
Combined, systemic, long term		0.593

4.3.13. Worker exposure: *Tabletting, compression, extrusion or pelletisation* (PROC 14)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304
Dermal, systemic, long term	0.014 mg/kg bw/day (TRA Workers 3.0)	0.014
Combined, systemic, long term		0.318

4.3.14. Worker exposure: *Drum and small package filling* (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304
Dermal, systemic, long term	0.014 mg/kg bw/day (TRA Workers 3.0)	0.014
Combined, systemic, long term		0.318

4.3.15. Worker exposure: *Equipment cleaning and maintenance* (PROC 8a, PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.255 mg/m³ (TRA Workers 3.0)	0.182

Route of exposure and type of effects	Exposure estimate	RCR
Dermal, systemic, long term	0.274 mg/kg bw/day (TRA Workers 3.0)	0.274
Combined, systemic, long term		0.457

4.3.16. Worker exposure: *Storage* (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	8.51E-3 mg/m³ (TRA Workers 3.0)	< 0.01
Dermal, systemic, long term	6.8E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.013

4.3.17. Worker exposure: *Storage* (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.17 mg/m³ (TRA Workers 3.0)	0.122
Dermal, systemic, long term	0.055 mg/kg bw/day (TRA Workers 3.0)	0.055
Combined, systemic, long term		0.176

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

Guidance: Guidance: The workers exposure and environmental emissions have been evaluated using EUSES (2.1.2), TRA Worker (v3). Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

5. ES 5: Use at industrial sites; Adhesives, Sealants (PC 1); Various sectors (SU 6a, SU 6b, SU 11, SU 12, SU 18)

5.1. Title section

ES name: *Adhesives, sealants; Resins (prepolymers)*
Product category: Adhesives, Sealants (PC 1)
Sector of use: Manufacture of wood and wood products (SU 6a), Manufacture of pulp, paper and paper products (SU 6b), Manufacture of rubber products (SU 11), Manufacture of plastics products, including compounding and conversion (SU 12), Manufacture of furniture (SU 18)

Environment		SPERC
1: *Adhesives, sealants; Resins (prepolymers)*	ERC 4	*ESVOC 4.3a.v1*
Worker		SWED
2: *General exposures; Closed systems*	PROC 1	
3: *General exposures; Closed systems; Use in contained systems; With sample collection*	PROC 2	
4: *Film formation - force drying, stoving and other technologies; Use in contained systems; Elevated temperature*	PROC 2	
5: *Film formation - air drying; Open systems*	PROC 4	
6: *Mixing operations; Closed systems; Batch process; Use in contained systems*	PROC 3	
7: *Preparation of material for application; Mixing operations; Open systems*	PROC 5	
8: *Spraying; Automated task*	PROC 7	
9: *Spraying; Manual*	PROC 7	
10: *Material transfers; Non-dedicated facility*	PROC 8a, PROC 28	
11: *Materials transfers; Dedicated facility*	PROC 8b	
12: *Roller, speader, flow application*	PROC 10	
13: *Dipping, immersion and pouring*	PROC 13	
14: *Laboratory activities*	PROC 15	
15: *Equipment cleaning and maintenance*	PROC 8a, PROC 28	
16: *Storage*	PROC 1	
17: *Material transfers; Drum/batch transfers; Transfer from/pouring from containers; Dedicated facility*	PROC 9	
18: *Tabletting, compression, extrusion or pelletisation*	PROC 14	

5.2. Conditions of use affecting exposure

5.2.1. Control of environmental exposure: *Adhesives, sealants; Resins (prepolymers)* (ERC 4)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 0.1 tonnes/day
Annual amount per site <= 2 tonnes/year
Technical and organisational conditions and measures
Typical measures to maintain workplace concentrations or airborne VOCs and particulates below respective OELS
No release to wastewater from process as such, wastewater emissions limited to release generated from final equipment cleaning step using water

Process optimized for efficient use of raw materials.
Conditions and measures related to biological sewage treatment plant
Assumed domestic sewage treatment plant flow >= 2E3 m3/day
Municipal sewage treatment plant is assumed.

5.2.2. Control of worker exposure: *General exposures; Closed systems* (PROC 1)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.3. Control of worker exposure: *General exposures; Closed systems; Use in contained systems; With sample collection* (PROC 2)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.4. Control of worker exposure: *Film formation - force drying, stoving and other technologies; Use in contained systems; Elevated temperature* (PROC 2)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure

Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 80 °C

5.2.5. Control of worker exposure: *Film formation - air drying; Open systems* (PROC 4)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.6. Control of worker exposure: *Mixing operations; Closed systems; Batch process; Use in contained systems* (PROC 3)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.7. Control of worker exposure: *Preparation of material for application; Mixing operations; Open systems* (PROC 5)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.8. Control of worker exposure: *Spraying; Automated task* (PROC 7)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 95 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.9. Control of worker exposure: *Spraying; Manual* (PROC 7)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 95 %; For further specification, refer to section 8 of the SDS.
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.10. Control of worker exposure: *Material transfers; Non-dedicated facility* (PROC 8a, PROC 28)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.11. Control of worker exposure: *Materials transfers; Dedicated facility* (PROC 8b)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure

Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 95 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.12. Control of worker exposure: *Roller, speader, flow application* (PROC 10)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.13. Control of worker exposure: *Dipping, immersion and pouring* (PROC 13)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.

Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.14. Control of worker exposure: *Laboratory activities* (PROC 15)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.15. Control of worker exposure: *Equipment cleaning and maintenance* (PROC 8a, PROC 28)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use

Assumes process temperature up to 40 °C

5.2.16. Control of worker exposure: *Storage* (PROC 1)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.17. Control of worker exposure: *Material transfers; Drum/batch transfers; Transfer from/pouring from containers; Dedicated facility* (PROC 9)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.18. Control of worker exposure: *Tabletting, compression, extrusion or pelletisation* (PROC 14)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).

Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.3. Exposure estimation and reference to its source

5.3.1. Environmental release and exposure: *Adhesives, sealants; Resins (prepolymers)* (ERC 4)

Release route	Release rate	Release estimation method
Water	2 kg/day	SPERC
Air	98 kg/day	SPERC
Soil	0 kg/day	SPERC

Protection target	Exposure estimate	RCR
Fresh water	0.013 mg/L (EUSES 2.1.2)	< 0.01
Sediment (freshwater)	0.058 mg/kg dw (EUSES 2.1.2)	< 0.01
Marine water	1.3E-3 mg/L (EUSES 2.1.2)	< 0.01
Sediment (marine water)	5.84E-3 mg/kg dw (EUSES 2.1.2)	< 0.01
Sewage Treatment Plant	0.126 mg/L (EUSES 2.1.2)	0.013
Agricultural soil	2.58E-3 mg/kg dw (EUSES 2.1.2)	< 0.01
Man via environment - Inhalation (systemic effects)	1.5E-3 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	2.29E-3 mg/kg bw/day (EUSES 2.1.2)	0.013
Man via environment - combined routes		0.019

5.3.2. Worker exposure: *General exposures; Closed systems* (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	8.51E-3 mg/m³ (TRA Workers 3.0)	< 0.01
Dermal, systemic, long term	6.8E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.013

5.3.3. Worker exposure: *General exposures; Closed systems; Use in contained systems; With sample collection* (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.851 mg/m³ (TRA Workers 3.0)	0.608
Dermal, systemic, long term	0.055 mg/kg bw/day (TRA Workers 3.0)	0.055
Combined, systemic, long term		0.663

5.3.4. Worker exposure: *Film formation - force drying, stoving and other technologies; Use in contained systems; Elevated temperature* (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304
Dermal, systemic, long term	5.48E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.309

5.3.5. Worker exposure: *Film formation - air drying; Open systems* (PROC 4)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304
Dermal, systemic, long term	0.027 mg/kg bw/day (TRA Workers 3.0)	0.027
Combined, systemic, long term		0.331

5.3.6. Worker exposure: *Mixing operations; Closed systems; Batch process; Use in contained systems* (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.255 mg/m³ (TRA Workers 3.0)	0.182
Dermal, systemic, long term	2.76E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.185

5.3.7. Worker exposure: *Preparation of material for application; Mixing operations; Open systems* (PROC 5)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304
Dermal, systemic, long term	0.055 mg/kg bw/day (TRA Workers 3.0)	0.055
Combined, systemic, long term		0.359

5.3.8. Worker exposure: *Spraying; Automated task* (PROC 7)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.766 mg/m³ (TRA Workers 3.0)	0.547
Dermal, systemic, long term	0.086 mg/kg bw/day (TRA Workers 3.0)	0.086
Combined, systemic, long term		0.633

5.3.9. Worker exposure: *Spraying; Manual* (PROC 7)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.766 mg/m³ (TRA Workers 3.0)	0.547
Dermal, systemic, long term	0.429 mg/kg bw/day (TRA Workers 3.0)	0.429
Combined, systemic, long term		0.976

5.3.10. Worker exposure: *Material transfers; Non-dedicated facility* (PROC 8a, PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.851 mg/m³ (TRA Workers 3.0)	0.608
Dermal, systemic, long term	0.055 mg/kg bw/day (TRA Workers 3.0)	0.055
Combined, systemic, long term		0.663

5.3.11. Worker exposure: *Materials transfers; Dedicated facility* (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.213 mg/m³ (TRA Workers 3.0)	0.152
Dermal, systemic, long term	0.027 mg/kg bw/day (TRA Workers 3.0)	0.027
Combined, systemic, long term		0.179

5.3.12. Worker exposure: *Roller, speader, flow application* (PROC 10)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.51 mg/m³ (TRA Workers 3.0)	0.365
Dermal, systemic, long term	0.274 mg/kg bw/day (TRA Workers 3.0)	0.274
Combined, systemic, long term		0.639

5.3.13. Worker exposure: *Dipping, immersion and pouring* (PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.851 mg/m³ (TRA Workers 3.0)	0.608
Dermal, systemic, long term	0.055 mg/kg bw/day (TRA Workers 3.0)	0.055
Combined, systemic, long term		0.663

5.3.14. Worker exposure: *Laboratory activities* (PROC 15)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304
Dermal, systemic, long term	1.36E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.305

5.3.15. Worker exposure: *Equipment cleaning and maintenance* (PROC 8a, PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.51 mg/m³ (TRA Workers 3.0)	0.365
Dermal, systemic, long term	0.055 mg/kg bw/day (TRA Workers 3.0)	0.055
Combined, systemic, long term		0.419

5.3.16. Worker exposure: *Storage* (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	8.51E-3 mg/m³ (TRA Workers 3.0)	< 0.01
Dermal, systemic, long term	6.8E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.013

5.3.17. Worker exposure: *Material transfers; Drum/batch transfers; Transfer from/pouring from containers; Dedicated facility* (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304
Dermal, systemic, long term	0.027 mg/kg bw/day (TRA Workers 3.0)	0.027
Combined, systemic, long term		0.331

5.3.18. Worker exposure: *Tabletting, compression, extrusion or pelletisation* (PROC 14)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304

Route of exposure and type of effects	Exposure estimate	RCR
Dermal, systemic, long term	0.014 mg/kg bw/day (TRA Workers 3.0)	0.014
Combined, systemic, long term		0.318

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

Guidance: Guidance: The workers exposure and environmental emissions have been evaluated using EUSES (2.1.2), TRA Worker (v3). Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

6. ES 6: Widespread use by professional workers; Adhesives, Sealants (PC 1); Various sectors (SU 6a, SU 6b, SU 11, SU 12, SU 18)

6.1. Title section

ES name: *Adhesives, sealants; Resins (prepolymers)*
Product category: Adhesives, Sealants (PC 1)
Sector of use: Manufacture of wood and wood products (SU 6a), Manufacture of pulp, paper and paper products (SU 6b), Manufacture of rubber products (SU 11), Manufacture of plastics products, including compounding and conversion (SU 12), Manufacture of furniture (SU 18)

Environment		SPERC
1: *Adhesives, sealants; Resins (prepolymers)*	ERC 8d	*ESVOC 8.3c.v1*
Worker		SWED
2: *General exposures; Closed systems*	PROC 1	
3: *General exposures; Closed systems; Use in contained systems*	PROC 2	
4: *Filling of equipment from drums or containers; Use in contained systems*	PROC 2	
5: *Preparation of material for application; Batch process; Use in contained systems*	PROC 3	
6: *Preparation of material for application; Indoor use*	PROC 5	
7: *Preparation of material for application; Outdoor use*	PROC 5	
8: *Material transfers; Drum/batch transfers; Non-dedicated facility*	PROC 8a	
9: *Material transfers; Drum/batch transfers; Dedicated facility*	PROC 8b	
10: *Roller, spreader, flow application; Indoor use*	PROC 10	
11: *Roller, spreader, flow application; Indoor use*	PROC 4	
12: *Roller, spreader, flow application; Outdoor use*	PROC 10	
13: *Spraying; Manual; Indoor use*	PROC 11	
14: *Spraying; Manual; Outdoor use*	PROC 11	
15: *Dipping, immersion and pouring; Indoor use*	PROC 13	
16: *Dipping, immersion and pouring; Outdoor use*	PROC 13	
17: *Laboratory activities*	PROC 15	
18: *Hand application - fingerpaints, pastels, adhesives; Indoor use*	PROC 19	
19: *Hand application - fingerpaints, pastels, adhesives; Outdoor use*	PROC 19	
20: *Equipment cleaning and maintenance*	PROC 8a, PROC 28	
21: *storage*	PROC 1	

6.2. Conditions of use affecting exposure

6.2.1. Control of environmental exposure: *Adhesives, sealants; Resins (prepolymers)* (ERC 8d)

Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Conditions and measures related to external treatment of waste (including article waste)
No waste from process

6.2.2. Control of worker exposure: *General exposures; Closed systems* (PROC 1)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.3. Control of worker exposure: *General exposures; Closed systems; Use in contained systems* (PROC 2)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Local exhaust ventilation; Inhalation - minimum efficiency of 80 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.4. Control of worker exposure: *Filling of equipment from drums or containers; Use in contained systems* (PROC 2)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Local exhaust ventilation; Inhalation - minimum efficiency of 80 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure

Indoor use
Assumes process temperature up to 40 °C

6.2.5. Control of worker exposure: *Preparation of material for application; Batch process; Use in contained systems* (PROC 3)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.6. Control of worker exposure: *Preparation of material for application; Indoor use* (PROC 5)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.7. Control of worker exposure: *Preparation of material for application; Outdoor use* (PROC 5)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

6.2.8. Control of worker exposure: *Material transfers; Drum/batch transfers; Non-dedicated facility* (PROC 8a)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.9. Control of worker exposure: *Material transfers; Drum/batch transfers; Dedicated facility* (PROC 8b)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.10. Control of worker exposure: *Roller, spreader, flow application; Indoor use* (PROC 10)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 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).
Local exhaust ventilation; Inhalation - minimum efficiency of 80 %
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.11. Control of worker exposure: *Roller, spreader, flow application; Indoor use* (PROC 4)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Local exhaust ventilation; Inhalation - minimum efficiency of 80 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.12. Control of worker exposure: *Roller, spreader, flow application; Outdoor use* (PROC 10)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.

Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

6.2.13. Control of worker exposure: *Spraying; Manual; Indoor use* (PROC 11)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 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).
Local exhaust ventilation; Inhalation - minimum efficiency of 80 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.14. Control of worker exposure: *Spraying; Manual; Outdoor use* (PROC 11)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 95 %; For further specification, refer to section 8 of the SDS.
Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

6.2.15. Control of worker exposure: *Dipping, immersion and pouring; Indoor use* (PROC 13)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Technical and organisational conditions and measures
Local exhaust ventilation; Inhalation - minimum efficiency of 80 %
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.16. Control of worker exposure: *Dipping, immersion and pouring; Outdoor use* (PROC 13)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

6.2.17. Control of worker exposure: *Laboratory activities* (PROC 15)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Local exhaust ventilation; Inhalation - minimum efficiency of 80 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those

described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.18. Control of worker exposure: *Hand application - fingerpaints, pastels, adhesives; Indoor use* (PROC 19)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 0.25 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).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.19. Control of worker exposure: *Hand application - fingerpaints, pastels, adhesives; Outdoor use* (PROC 19)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 0.25 h/day
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable respiratory protection.; Inhalation - minimum efficiency of 90 %; For further specification, refer to section 8 of the SDS.
Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply
Use suitable eye protection.

6.2.20. Control of worker exposure: *Equipment cleaning and maintenance*

(PROC 8a, PROC 28)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 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).
Local exhaust ventilation; Inhalation - minimum efficiency of 80 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.2.21. Control of worker exposure: *storage* (PROC 1)

Product (article) characteristics
Covers concentrations up to 5 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.3. Exposure estimation and reference to its source

6.3.1. Environmental release and exposure: *Adhesives, sealants; Resins (prepolymers)* (ERC 8d)

Release route	Release rate	Release estimation method
Water	0.2 kg/day	SPERC
Air	19.7 kg/day	SPERC
Soil	0.1 kg/day	SPERC

Protection target	Exposure estimate	RCR
Fresh water	1.66E-3 mg/L (EUSES 2.1.2)	< 0.01
Sediment (freshwater)	7.43E-3 mg/kg dw (EUSES 2.1.2)	< 0.01
Marine water	1.63E-4 mg/L (EUSES 2.1.2)	< 0.01
Sediment (marine water)	7.32E-4 mg/kg dw (EUSES 2.1.2)	< 0.01
Sewage Treatment Plant	0.013 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	3.3E-4 mg/kg dw (EUSES 2.1.2)	< 0.01

Protection target	Exposure estimate	RCR
Man via environment - Inhalation (systemic effects)	3.02E-6 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	5.86E-5 mg/kg bw/day (EUSES 2.1.2)	< 0.01
Man via environment - combined routes		< 0.01

6.3.2. Worker exposure: *General exposures; Closed systems* (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	8.51E-3 mg/m³ (TRA Workers 3.0)	< 0.01
Dermal, systemic, long term	6.8E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.013

6.3.3. Worker exposure: *General exposures; Closed systems; Use in contained systems* (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.851 mg/m³ (TRA Workers 3.0)	0.608
Dermal, systemic, long term	0.011 mg/kg bw/day (TRA Workers 3.0)	0.011
Combined, systemic, long term		0.619

6.3.4. Worker exposure: *Filling of equipment from drums or containers; Use in contained systems* (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.851 mg/m³ (TRA Workers 3.0)	0.608
Dermal, systemic, long term	0.011 mg/kg bw/day (TRA Workers 3.0)	0.011
Combined, systemic, long term		0.619

6.3.5. Worker exposure: *Preparation of material for application; Batch process; Use in contained systems* (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.511 mg/m³ (TRA Workers 3.0)	0.365
Dermal, systemic, long term	0.028 mg/kg bw/day (TRA Workers 3.0)	0.028
Combined, systemic, long term		0.392

6.3.6. Worker exposure: *Preparation of material for application; Indoor use* (PROC 5)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.51 mg/m³ (TRA Workers 3.0)	0.365
Dermal, systemic, long term	0.548 mg/kg bw/day (TRA Workers 3.0)	0.548
Combined, systemic, long term		0.913

6.3.7. Worker exposure: *Preparation of material for application; Outdoor use* (PROC 5)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.357 mg/m³ (TRA Workers 3.0)	0.255
Dermal, systemic, long term	0.548 mg/kg bw/day (TRA Workers 3.0)	0.548
Combined, systemic, long term		0.804

6.3.8. Worker exposure: *Material transfers; Drum/batch transfers; Non-*

dedicated facility (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.425 mg/m³ (TRA Workers 3.0)	0.304
Dermal, systemic, long term	0.548 mg/kg bw/day (TRA Workers 3.0)	0.548
Combined, systemic, long term		0.852

6.3.9. Worker exposure: *Material transfers; Drum/batch transfers; Dedicated facility* (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.851 mg/m³ (TRA Workers 3.0)	0.608
Dermal, systemic, long term	0.11 mg/kg bw/day (TRA Workers 3.0)	0.11
Combined, systemic, long term		0.717

6.3.10. Worker exposure: *Roller, spreader, flow application; Indoor use* (PROC 10)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.596 mg/m³ (TRA Workers 3.0)	0.425
Dermal, systemic, long term	0.549 mg/kg bw/day (TRA Workers 3.0)	0.549
Combined, systemic, long term		0.974

6.3.11. Worker exposure: *Roller, spreader, flow application; Indoor use* (PROC 4)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.34 mg/m³ (TRA Workers 3.0)	0.243
Dermal, systemic, long term	0.055 mg/kg bw/day (TRA Workers 3.0)	0.055
Combined, systemic, long term		0.298

6.3.12. Worker exposure: *Roller, spreader, flow application; Outdoor use* (PROC 10)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.298 mg/m³ (TRA Workers 3.0)	0.213
Dermal, systemic, long term	0.549 mg/kg bw/day (TRA Workers 3.0)	0.549
Combined, systemic, long term		0.761

6.3.13. Worker exposure: *Spraying; Manual; Indoor use* (PROC 11)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.715 mg/m³ (TRA Workers 3.0)	0.511
Dermal, systemic, long term	0.429 mg/kg bw/day (TRA Workers 3.0)	0.429
Combined, systemic, long term		0.939

6.3.14. Worker exposure: *Spraying; Manual; Outdoor use* (PROC 11)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.596 mg/m³ (TRA Workers 3.0)	0.425
Dermal, systemic, long term	0.43 mg/kg bw/day (Consexpo Web)	0.43
Combined, systemic, long term		0.855

6.3.15. Worker exposure: *Dipping, immersion and pouring; Indoor use*

(PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.021 mg/m³ (TRA Workers 3.0)	0.729
Dermal, systemic, long term	0.11 mg/kg bw/day (TRA Workers 3.0)	0.11
Combined, systemic, long term		0.839

6.3.16. Worker exposure: *Dipping, immersion and pouring; Outdoor use* (PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.357 mg/m³ (TRA Workers 3.0)	0.255
Dermal, systemic, long term	0.548 mg/kg bw/day (TRA Workers 3.0)	0.548
Combined, systemic, long term		0.804

6.3.17. Worker exposure: *Laboratory activities* (PROC 15)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.851 mg/m³ (TRA Workers 3.0)	0.608
Dermal, systemic, long term	2.72E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.61

6.3.18. Worker exposure: *Hand application - fingerpaints, pastels, adhesives; Indoor use* (PROC 19)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.149 mg/m³ (TRA Workers 3.0)	0.106
Dermal, systemic, long term	0.891 mg/kg bw/day (Riskofderm)	0.891
Combined, systemic, long term		0.997

6.3.19. Worker exposure: *Hand application - fingerpaints, pastels, adhesives; Outdoor use* (PROC 19)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.149 mg/m³ (TRA Workers 3.0)	0.106
Dermal, systemic, long term	0.891 mg/kg bw/day (Riskofderm)	0.891
Combined, systemic, long term		0.997

6.3.20. Worker exposure: *Equipment cleaning and maintenance* (PROC 8a, PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.596 mg/m³ (TRA Workers 3.0)	0.425
Dermal, systemic, long term	0.11 mg/kg bw/day (TRA Workers 3.0)	0.11
Combined, systemic, long term		0.535

6.3.21. Worker exposure: *storage* (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	8.51E-3 mg/m³ (TRA Workers 3.0)	< 0.01
Dermal, systemic, long term	6.8E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.013

6.4. Guidance to DU to evaluate whether he works inside the

boundaries set by the ES

Guidance: The workers exposure and environmental emissions have been evaluated using EUSES (2.1.2), TRA Worker (v3), Consexpo (WEB 1.0.1), and Risk of Derm. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

7. ES 7: Use at industrial sites; Laboratory Chemicals (PC 21); Scientific research and development (SU 24)

7.1. Title section

ES name: *Use as laboratory reagent*
Product category: Laboratory Chemicals (PC 21)
Sector of use: Scientific research and development (SU 24)

Environment	
1: *Use as laboratory reagent*	ERC 4
Worker	
2: *Laboratory activities*	PROC 15

7.2. Conditions of use affecting exposure

7.2.1. Control of environmental exposure: *Use as laboratory reagent* (ERC 4)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 0.05 tonnes/day
Annual amount per site <= 1 tonnes/year
Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Assumed domestic sewage treatment plant flow >= 2E3 m3/day
Other conditions affecting environmental exposure
Receiving surface water flow >= 1.8E4 m3/day

7.2.2. Control of worker exposure: *Laboratory activities* (PROC 15)

Product (article) characteristics
Covers concentrations up to 100 %
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 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).
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.
Local exhaust ventilation; Inhalation - minimum efficiency of 90 %
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.
Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

7.3. Exposure estimation and reference to its source

7.3.1. Environmental release and exposure: *Use as laboratory reagent* (ERC 4)

Release route	Release rate	Release estimation method
Water	50 kg/day	ERC
Air	50 kg/day	ERC
Soil	2.5 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	0.317 mg/L (EUSES 2.1.2)	0.167
Sediment (freshwater)	1.42 mg/kg dw (EUSES 2.1.2)	0.165
Marine water	0.032 mg/L (EUSES 2.1.2)	0.167
Sediment (marine water)	0.142 mg/kg dw (EUSES 2.1.2)	0.165
Sewage Treatment Plant	3.161 mg/L (EUSES 2.1.2)	0.316
Agricultural soil	0.057 mg/kg dw (EUSES 2.1.2)	0.094
Man via environment - Inhalation (systemic effects)	7.65E-4 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	2.84E-3 mg/kg bw/day (EUSES 2.1.2)	0.016
Man via environment - combined routes		0.019

7.3.2. Worker exposure: *Laboratory activities* (PROC 15)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.893 mg/m³ (TRA Workers 3.0)	0.638
Dermal, systemic, long term	3.4E-3 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.642

7.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance: Guidance: The workers exposure and environmental emissions have been evaluated using EUSES (2.1.2), TRA Worker (v3). Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.