SAFETY DATA SHEET

Pentaethylenehexamine, PEHA

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

1.1 Product identifier

Product name : Pentaethylenehexamine, PEHA

Index number : 612-064-00-2

EC number : 223-775-9

REACH Registration number

Registration number	Legal entity
01-219485826-22-0000	Delamine BV

CAS number : 4067-16-7

Product description : Not applicable

Product type : Liquid.

Other means of identification : 3,6,9,12-tetraazatetradecamethylenediamine; Pentaethylenehexamine; 3,6,9,12-Tetraazatetradecane-1,14-diamine; pentacthylenehexamine

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

Product use : Adhesives, binding agents Dye. Pigments. Complexing agents Fuel. Fuel additive. Impregnation agents Intermediate. Lubricants and additives Laboratory activities Pharmaceuticals. Surface-active agents

Area of application : Consumer applications.

Identified uses
Consumer uses of ethyleneamines
Handling of solid products with small amounts of unbound ethylenamines - Use of preparations containing EA up to 0.5% - Professional
Handling of solid products with small amounts of unbound ethylenamines - Use of preparations containing EA up to 2% - Professional
Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 100% - Industrial
Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 2% - Industrial
Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 0.5% - Industrial
Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 2% - Professional
Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 0.5% - Professional
Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 25% - Industrial
Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 15% - Industrial
Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 2% - Industrial
Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 0.5% - Industrial
Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 25% - Professional
Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 15% - Professional
Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 2% - Professional
Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 0.5% - Professional
Use of preparations containing ethylenamines in open processes with low exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 2% - Industrial
Use of preparations containing ethylenamines in open processes with low exposure potential and evaporation as

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

most likely exposure form - Use of preparations containing EA up to 0.5% - Industrial

Use of preparations containing ethylenamines in open processes with low exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 2% - Professional

Use of preparations containing ethylenamines in open processes with low exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 0.5% - Professional

1.3 Details of the supplier of the safety data sheet

DELAMINE B.V.
Barchman Wuytierslaan 10
3818 LH Amersfoort
The Netherlands
Tel.:31-334676897

e-mail address of person responsible for this SDS : SDS.Delamine@delamine.com

1.4 Emergency telephone number

Supplier

Telephone number : AkzoNobel Chemicals-Deventer-NLT +31 570 679211 (24hours/7days)
F +31 570 679801

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Product definition : UVCB

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

Acute Tox. 4, H302
Acute Tox. 4, H312
Skin Corr. 1A, H314
Eye Dam. 1, H318
Skin Sens. 1, H317
Aquatic Acute 1, H400
Aquatic Chronic 1, H410

Classification according to Directive 67/548/EEC [DSD]

Xn; R21/22
C; R34
R43
N; R50/53

See Section 16 for the full text of the R phrases or H statements declared above.
See Section 11 for more detailed information on health effects and symptoms.

2.2 Label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Harmful if swallowed.
Harmful in contact with skin.
Causes severe skin burns and eye damage.
May cause an allergic skin reaction.
Very toxic to aquatic life with long lasting effects.

Precautionary statements

SECTION 2: Hazards identification

Prevention : Wear protective gloves: >8 hours (breakthrough time): neoprene. Wear eye or face protection. Wear protective clothing. Avoid release to the environment.

Response : IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or physician. IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Immediately call a POISON CENTER or physician. IF IN EYES: Immediately call a POISON CENTER or physician.

Storage : Store locked up.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements : Not applicable.

Special packaging requirements

Containers to be fitted with child-resistant fastenings : Yes, applicable.

Tactile warning of danger : Yes, applicable.

2.3 Other hazards

Substance meets the criteria for PBT according to Regulation (EC) No. 1907/2006, Annex XIII : No.

Substance meets the criteria for vPvB according to Regulation (EC) No. 1907/2006, Annex XIII : No.

Other hazards which do not result in classification : Not applicable.

SECTION 3: Composition/information on ingredients

Substance/mixture : UVCB

Product/ingredient name	Identifiers	%	Classification		Type
			67/548/EEC	Regulation (EC) No. 1272/2008 [CLP]	
3,6,9,12-tetra-azatetradecamethylenediamine	REACH #: 01-219485826-22-0 EC: 223-775-9 CAS: 4067-16-7 Index: 612-064-00-2	100	Xn; R21/22 C; R34 R43 N; R50/53 **See section 16 for the full text of the R-phrases declared above**	Acute Tox. 4, H302 Acute Tox. 4, H312 Skin Corr. 1A, H314 Eye Dam. 1, H318 Skin Sens. 1, H317 Aquatic Acute 1, H400 Aquatic Chronic 1, H410 **See Section 16 for the full text of the H statements declared above.**	[*]

There are no additional ingredients present which, within the current knowledge of the supplier, are classified and contribute to the classification of the substance and hence require reporting in this section.

Type

SECTION 3: Composition/information on ingredients

[*] Substance
[A] Constituent
[B] Impurity
[C] Stabilising additive

Occupational exposure limits, if available, are listed in Section 8.

SECTION 4: First aid measures

4.1 Description of first aid measures

Eye contact : Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

Inhalation : Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Get medical attention immediately. Call a poison center or physician. Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

4.2 Most important symptoms and effects, both acute and delayed

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : May give off gas, vapor or dust that is very irritating or corrosive to the respiratory system. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Causes severe burns. Harmful in contact with skin. May cause an allergic skin reaction.

Ingestion : Harmful if swallowed. May cause burns to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain
watering
redness

SECTION 4: First aid measures

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur

Ingestion : Adverse symptoms may include the following:
stomach pains

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.Dry sand or other suitable absorbent. Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Halones

5.2 Special hazards arising from the substance or mixture

Hazards from the substance or mixture : In a fire or if heated, a pressure increase will occur and the container may burst. This material is very toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous combustion products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides

5.3 Advice for firefighters

Special precautions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Do not breathe vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

6.2 Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

SECTION 6: Accidental release measures

6.3 Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

6.4 Reference to other sections : See Section 1 for emergency contact information.
See Section 8 for information on appropriate personal protective equipment.
See Section 13 for additional waste treatment information.

SECTION 7: Handling and storage

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

7.1 Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not breathe vapour or mist. Do not ingest. Avoid release to the environment. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Keep away from acids. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

7.2 Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Store locked up. Separate from acids. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

7.3 Specific end use(s)

Recommendations : No specific data.

Industrial sector specific solutions : No specific data.

SECTION 8: Exposure controls/personal protection

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

8.1 Control parameters

Occupational exposure limits

No exposure limit value known.

SECTION 8: Exposure controls/personal protection

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to European Standard EN 689 for methods for the assessment of exposure by inhalation to chemical agents and national guidance documents for methods for the determination of hazardous substances.

Derived effect levels

Product/ingredient name	Type	Exposure	Value	Population	Effects
3,6,9,12-tetra-azatetradecamethylenediamine	DNEL	Short term Inhalation	8550 mg/m³	Workers	Systemic
	DNEL	Long term Dermal	0.91 mg/kg bw/day	Workers	Systemic
	DNEL	Long term Inhalation	1.59 mg/m³	Workers	Systemic
	DNEL	Long term Dermal	0.044 mg/cm²	Workers	Local
	DNEL	Short term Dermal	13 mg/kg bw/day	Consumers	Systemic
	DNEL	Short term Inhalation	2542 mg/m³	Consumers	Systemic
	DNEL	Short term Oral	32 mg/kg bw/day	Consumers	Systemic
	DNEL	Short term Dermal	1.59 mg/cm²	Consumers	Local
	DNEL	Long term Dermal	0.4 mg/kg bw/day	Consumers	Systemic
	DNEL	Long term Inhalation	0.46 mg/m³	Consumers	Systemic
	DNEL	Long term Oral	0.65 mg/kg bw/day	Consumers	Systemic
	DNEL	Long term Dermal	0.68 mg/cm²	Consumers	Local

Predicted effect concentrations

Product/ingredient name	Type	Compartment Detail	Value	Method Detail
3,6,9,12-tetra-azatetradecamethylenediamine	PNEC	Secondary Poisoning	0.29 mg/kg	Assessment Factors
	PNEC	Fresh water	2.5 µg/l	Assessment Factors
	PNEC	Marine	2.5 µg/l	Assessment Factors
	PNEC	Fresh water sediment	0.22 mg/kg dwt	-
	PNEC	Marine water sediment	0.14 mg/kg dwt	-
	PNEC	Soil	0.18 mg/kg dwt	-
	PNEC	Sewage Treatment Plant	1.64 mg/l	Assessment Factors

8.2 Exposure controls

Appropriate engineering controls : If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts.

SECTION 8: Exposure controls/personal protection

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. >8 hours (breakthrough time): neoprene

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Recommended: neoprene Boots.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: ammonia filter (Type K) ammonia (Type K) and particulate filter

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state : Liquid. [Clear.]

Colour : Yellow. [Light]

Odour : Odourless.

Odour threshold : Not available.

pH : 12.6

Melting point/freezing point : <-70°C Pour point < - 20 C

Initial boiling point and boiling range : 426°C

Flash point : Closed cup: 183°C

Evaporation rate : Not available.

Flammability (solid, gas) : Not applicable

Burning time : Not applicable.

Burning rate : Not applicable.

Upper/lower flammability or explosive limits : Not available.

Vapour pressure : 0.0000017 kPa [20°C]

Vapour density : Not available.

Relative density : 1.003

Solubility(ies) :

>500 g/l

Partition coefficient: n-octanol/water : -3.67

Auto-ignition temperature : 335°C

Decomposition temperature : Not available.

Viscosity : Not available.

Explosive properties : Not applicable.

Oxidising properties : None.

9.2 Other information

SECTION 9: Physical and chemical properties

No additional information.

SECTION 10: Stability and reactivity

10.1 Reactivity : No specific test data related to reactivity available for this product or its ingredients.

10.2 Chemical stability : The product is stable.

10.3 Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

10.4 Conditions to avoid : Keep away from sources of ignition - No smoking. aerosol or mist formation

10.5 Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials, metals and acids.
Chlorinated hydrocarbon.

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

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
3,6,9,12-tetra-azatetradecamethylenediamine	LD50 Oral	Rat	1600 mg/kg	-

Conclusion/Summary : Oral Harmful if swallowed.
Dermal Harmful in contact with skin.
Inhalation No applicable toxicity data Not classified as dangerous

Irritation/Corrosion

Conclusion/Summary

Skin : Corrosive to the skin.

Eyes : Corrosive to eyes.

Respiratory : No data available for this end-point, hence this classification is not considered to be applicable.

Sensitiser

Product/ingredient name	Route of exposure	Species	Result
3,6,9,12-tetra-azatetradecamethylenediamine	skin	Guinea pig	Sensitising

Conclusion/Summary

Skin : May cause skin sensitisation.

Respiratory : No data available for this end-point, hence this classification is not considered to be applicable.

Mutagenicity

Product/ingredient name	Test	Experiment	Result
3,6,9,12-tetra-azatetradecamethylenediamine	-	Experiment: In vivo Subject: Mammalian-Animal Cell: Germ	Negative

Conclusion/Summary : No mutagenic effect.

Carcinogenicity

Conclusion/Summary : skin No carcinogenic effect.

SECTION 11: Toxicological information

Reproductive toxicity

Conclusion/Summary : Fertility : No data available for this end-point, hence this classification is not considered to be applicable.
Developmental Toxicity: No data available for this end-point, hence this classification is not considered to be applicable.

Teratogenicity

Conclusion/Summary : No known significant effects or critical hazards.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated:Oral.

Potential acute health effects

Inhalation : May give off gas, vapor or dust that is very irritating or corrosive to the respiratory system. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Ingestion : Harmful if swallowed. May cause burns to mouth, throat and stomach.

Skin contact : Causes severe burns. Harmful in contact with skin. May cause an allergic skin reaction.

Eye contact : Causes serious eye damage.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation : No specific data.

Ingestion : Adverse symptoms may include the following:
stomach pains

Skin contact : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur

Eye contact : Adverse symptoms may include the following:
pain
watering
redness

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : No specific data.

Potential delayed effects : No specific data.

Long term exposure

Potential immediate effects : No specific data.

Potential delayed effects : No specific data.

Potential chronic health effects

Product/ingredient name	Result	Species	Dose	Exposure
3,6,9,12-tetra-azatetradecamethylenediamine	Sub-chronic LOAEL Oral	Rat	52 mg/kg	-

Conclusion/Summary : Not classified as dangerous

General : Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity : No known significant effects or critical hazards.

SECTION 11: Toxicological information

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Absorption : Slowly absorbed.

Metabolism : Rapidly metabolised.

Elimination : Rapidly excreted.

Other information : No specific data.

SECTION 12: Ecological information

12.1 Toxicity

Product/ingredient name	Result	Species	Exposure
3,6,9,12-tetra-azatetradecamethylenediamine	EC50 164 mg/l	Micro-organism	2 hours
	Acute EC50 0.7 mg/l Fresh water	Algae	72 hours
	Acute EC50 17.5 mg/l Fresh water	Daphnia	48 hours
	Acute LC50 180 mg/l Fresh water	Fish	96 hours
	Chronic NOEC 0.8 mg/l Fresh water	Daphnia	14 days

Conclusion/Summary : Dangerous for the environment.
PNEC Intermittent release.= 0.025 mg/l

12.2 Persistence and degradability

Conclusion/Summary : Not readily biodegradable. This substance is not expected to bioaccumulate through food chains in the environment.

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
3,6,9,12-tetra-azatetradecamethylenediamine	-	-	Not readily

12.3 Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
3,6,9,12-tetra-azatetradecamethylenediamine	-3.67	-	low

12.4 Mobility in soil

Soil/water partition coefficient (K_{OC}) : >3000

Mobility : No specific data.

12.5 Results of PBT and vPvB assessment

PBT : No.

vPvB : No.

12.6 Other adverse effects : No known significant effects or critical hazards.

SECTION 13: Disposal considerations

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

13.1 Waste treatment methods

Product

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Hazardous waste : The classification of the product may meet the criteria for a hazardous waste.

Packaging

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Special precautions : This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

SECTION 14: Transport information

	ADR/RID	ADN/ADNR	IMDG	IATA
14.1 UN number	UN2735	UN2735	UN2735	UN2735
14.2 UN proper shipping name	POLYAMINES, LIQUID, CORROSIVE, N.O.S.	POLYAMINES, LIQUID, CORROSIVE, N.O.S.	POLYAMINES, LIQUID, CORROSIVE, N.O.S.. Marine pollutant (Amines, polyethylenepoly-)	Polyamines, liquid, corrosive, n.o.s.
14.3 Transport hazard class(es)	8 	8 	8 	8 
14.4 Packing group	III	III	III	III
14.5 Environmental hazards	Yes.	Yes.	Yes.	Yes.
14.6 Special precautions for user	Not available.	Not available.	Not available.	Not available.
Additional information	**Hazard identification number** 80 **Limited quantity** 5 L **Special provisions** 274 **Tunnel code** (E)	-	**Emergency schedules (EmS)** F-A, S-B	**Passenger and Cargo Aircraft** Quantity limitation: 5 L Packaging instructions: 852 **Cargo Aircraft Only** Quantity limitation: 60 L Packaging instructions: 856 **Limited Quantities - Passenger Aircraft** Quantity limitation: 1 L

SECTION 14: Transport information

				Packaging instructions: Y841

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

SECTION 15: Regulatory information

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

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XIV - List of substances subject to authorisation

Substances of very high concern

None of the components are listed.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles : Not applicable.

Other EU regulations

Europe inventory : All components are listed or exempted.

Black List Chemicals : Not listed

Priority List Chemicals : Not listed

Integrated pollution prevention and control list (IPPC) - Air : Not listed

Integrated pollution prevention and control list (IPPC) - Water : Not listed

International regulations

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

15.2 Chemical Safety Assessment : Complete.

15.3 Registration status : Applicable.

SECTION 16: Other information

Indicates information that has changed from previously issued version.

Abbreviations and acronyms : ATE = Acute Toxicity Estimate
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
DNEL = Derived No Effect Level
EUH statement = CLP-specific Hazard statement
PNEC = Predicted No Effect Concentration
RRN = REACH Registration Number

SECTION 16: Other information

Procedure used to derive the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Classification	Justification
Acute Tox. 4, H302	Expert judgment
Acute Tox. 4, H312	Expert judgment
Skin Corr. 1A, H314	Expert judgment
Eye Dam. 1, H318	Expert judgment
Skin Sens. 1, H317	Expert judgment
Aquatic Acute 1, H400	Expert judgment
Aquatic Chronic 1, H410	Expert judgment

Full text of abbreviated H statements : H302 Harmful if swallowed.
H312 Harmful in contact with skin.
H314 Causes severe skin burns and eye damage.
H317 May cause an allergic skin reaction.
H318 Causes serious eye damage.
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.

Full text of classifications [CLP/GHS] :

Acute Tox. 4, H302	ACUTE TOXICITY: ORAL - Category 4
Acute Tox. 4, H312	ACUTE TOXICITY: SKIN - Category 4
Aquatic Acute 1, H400	AQUATIC TOXICITY (ACUTE) - Category 1
Aquatic Chronic 1, H410	AQUATIC TOXICITY (CHRONIC) - Category 1
Eye Dam. 1, H318	SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1
Skin Corr. 1A, H314	SKIN CORROSION/IRRITATION - Category 1A
Skin Sens. 1, H317	SKIN SENSITIZATION - Category 1

Full text of abbreviated R phrases : R21/22- Harmful in contact with skin and if swallowed.
R34- Causes burns.
R43- May cause sensitisation by skin contact.
R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Full text of classifications [DSD/DPD] : C - Corrosive
Xn - Harmful
N - Dangerous for the environment

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Version : 4

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Annex to the extended Safety Data Sheet (eSDS)

Consumer

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Consumer uses of ethyleneamines **Sector of end use:** SU21 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f **Market sector by type of chemical product:** PC01, PC09b **Article category related to subsequent service life:** Not applicable.
List of use descriptors	**Identified use name:** Consumer uses of ethyleneamines **Sector of end use:** SU21 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f **Market sector by type of chemical product:** PC01, PC09b **Article category related to subsequent service life:** Not applicable.
Processes and activities covered by the exposure scenario	Not applicable.
Assessment Method	See Section 3

Section 2: Operational conditions and risk management measures

Section 2.1: Control of consumer exposure

Physical state: Physical state: liquid
Molecular weight: 146.23 g/mole
Vapour pressure: 0.346 Pa*s at 25°C

Contributing scenarios: Operational conditions and risk management measures

Product Categories 1: Adhesives, sealants Mixing and loading
Operations Conditions (consumer):
- Covers use up to 3 days/Year
- Covers use up to 25%
- For each use event, covers use amounts up to 20 g
- Covers exposure up to 5 minutes/event

Risk Management Measures (consumer): No specific risk management measure identified beyond those operational conditions stated. Avoid using at a product concentration greater than 25%

Product Categories 1: Adhesives, sealants Application:
Operations Conditions (consumer):
- Covers use up to 3 days/Year
- Covers use up to 5%
- For each use event, covers use amounts up to 20 g
- Covers use in room size of 20 m^3
- Covers exposure up to 90 minutes/event

Risk Management Measures (consumer): No specific risk management measure identified beyond those operational conditions stated. Avoid using at a product concentration greater than 5%

Product Categories 9b: Fillers, putties, plasters, modelling clay
Operations Conditions (consumer):
- Covers use up to 2 days/Year
- Covers use up to 25%
- For each use event, covers use amounts up to 200 g
- Covers exposure up to 5 minutes/event

Risk Management Measures (consumer): No specific risk management measure identified beyond those operational conditions stated. Avoid using at a product concentration greater than 25%

Product Categories 9b: Fillers, putties, plasters, modelling clay Application:
Operations Conditions (consumer):
- Covers use up to 2 days/Year
- Covers use up to 5%
- For each use event, covers use amounts up to 200 g
- Covers use in room size of 20 m^3
- Covers exposure up to 90 minutes/event

Risk Management Measures (consumer): No specific risk management measure identified beyond those operational conditions stated. Avoid using at a product concentration greater than 5%

Section 2.1: Control of consumer exposure

Physical state:

Physical state: liquid
Molecular weight: 146.23 g/mole
Vapour pressure: 0.346 Pa*s at 25°C

Contributing scenarios: Operational conditions and risk management measures

Product Categories 1: Adhesives, sealants Mixing and loading
Operations Conditions (consumer):
- Covers use up to 3 days/Year
- Covers use up to 25%
- For each use event, covers use amounts up to 20 g
- Covers exposure up to 5 minutes/event
Risk Management Measures (consumer): No specific risk management measure identified beyond those operational conditions stated. Avoid using at a product concentration greater than 25%

Product Categories 1: Adhesives, sealants Application:
Operations Conditions (consumer):
- Covers use up to 3 days/Year
- Covers use up to 5%
- For each use event, covers use amounts up to 20 g
- Covers use in room size of 20 m^3
- Covers exposure up to 90 minutes/event
Risk Management Measures (consumer): No specific risk management measure identified beyond those operational conditions stated. Avoid using at a product concentration greater than 5%

Product Categories 9b: Fillers, putties, plasters, modelling clay
Operations Conditions (consumer):
- Covers use up to 2 days/Year
- Covers use up to 25%
- For each use event, covers use amounts up to 200 g
- Covers exposure up to 5 minutes/event
Risk Management Measures (consumer): No specific risk management measure identified beyond those operational conditions stated. Avoid using at a product concentration greater than 25%

Product Categories 9b: Fillers, putties, plasters, modelling clay Application:
Operations Conditions (consumer):
- Covers use up to 2 days/Year
- Covers use up to 5%
- For each use event, covers use amounts up to 200 g
- Covers use in room size of 20 m^3
- Covers exposure up to 90 minutes/event
Risk Management Measures (consumer): No specific risk management measure identified beyond those operational conditions stated. Avoid using at a product concentration greater than 5%

Section 2.1: Control of consumer exposure

Physical state:

Physical state: liquid
Molecular weight: 146.23 g/mole
Vapour pressure: 0.346 Pa*s at 25°C

Contributing scenarios: Operational conditions and risk management measures

Product Categories 1: Adhesives, sealants Mixing and loading
Operations Conditions (consumer):
- Covers use up to 3 days/Year
- Covers use up to 25%
- For each use event, covers use amounts up to 20 g
- Covers exposure up to 5 minutes/event
Risk Management Measures (consumer): No specific risk management measure identified beyond those operational conditions stated. Avoid using at a product concentration greater than 25%

Product Categories 1: Adhesives, sealants Application:
Operations Conditions (consumer):
- Covers use up to 3 days/Year
- Covers use up to 5%
- For each use event, covers use amounts up to 20 g
- Covers use in room size of 20 m^3
- Covers exposure up to 90 minutes/event
Risk Management Measures (consumer): No specific risk management measure identified beyond those operational conditions stated. Avoid using at a product concentration greater than 5%

Product Categories 9b: Fillers, putties, plasters, modelling clay
Operations Conditions (consumer):
- Covers use up to 2 days/Year
- Covers use up to 25%
- For each use event, covers use amounts up to 200 g
- Covers exposure up to 5 minutes/event
Risk Management Measures (consumer): No specific risk management measure identified beyond those operational conditions stated. Avoid using at a product concentration greater than 25%

Product Categories 9b: Fillers, putties, plasters, modelling clay Application:
Operations Conditions (consumer):
- Covers use up to 2 days/Year
- Covers use up to 5%
- For each use event, covers use amounts up to 200 g

- Covers use in room size of 20 m^3
- Covers exposure up to 90 minutes/event

Risk Management Measures (consumer): No specific risk management measure identified beyond those operational conditions stated. Avoid using at a product concentration greater than 5%

Section 2.2: Control of environmental exposure

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Average Local Daily Tonnage (kg/day)	1019
Frequency and duration of use:	Continuous release.

Section 2.2: Control of environmental exposure

Operational conditions: Not determined

Product Characteristics:	Indoor/Outdoor use.
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Average Local Daily Tonnage (kg/day)	1019
Frequency and duration of use:	Continuous release.

Section 2.2: Control of environmental exposure

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Regional use tonnage (tonnes/year):	372
Fraction of Regional tonnage used locally:	20%
Average Local Daily Tonnage (kg/day)	204
Frequency and duration of use:	Continuous release.

Section 3: Exposure estimation and reference to its source

Section 3.1: Exposure estimation - Consumers

	Contributing Scenario:	Frequency (1/Year):	Weight fraction of substance in the article::	Body weight:	Calculation method:
Exposure estimation and reference to its source - Consumers: 0:	Adhesives, sealants - Mixing and loading; Adhesives, sealants - Application(s); Fillers, putties, plasters, modelling clay - Mixing and loading; Fillers, putties, plasters, modelling clay - Application(s)	3; 3; 2; 2	25%; 5%; 25%; 5%	60 kg	ConsExpo 4.1

Inhalation :

Mode of release: evaporation

Exposure estimation and reference to its source - Consumers: 1:

Exposure (minutes):	Application duration:	Amount/concentration applied (g):	Room volume (m^3):	Room volume x ventilation rate: (l/h):
5; 90; 5; 90	5; 30; 5; 30	20; 20; 200; 200	1; 20; 1; 20	0.6

Release area (cm2):	Temperature (°C):	Mass transfer rate:	Contributing Scenario Molecular weight (g/mole):	Uptake fraction (Update model):	Inhalation rate:
20; 500; 100; 50	20	3.09E+03	550	1	32.9

Dermal:

Application methods: instant

Surface area (Skin contact area) cm2:	Product amount (g):	Uptake fraction (Update model):	Inhalation event (mg/m^3):
2; 43; 2; 22	0.05; 0.1; 0.02; 1	1	11.2; 3.0; 11.5; 3.1

Inhalation mg/m^3 (Concentration on day of exposure):	Dermal load (mg/cm2):	Dermal External dose (mg/kg bw):	Dermal (Internal dose) mg/kg bw/day:
0.039; 0.188; 0.040; 0.191	6.25; 0.12; 2.5; 0.46	0.208; 0.08; 0.08; 1.67	0.002; 0.001; 5E-4; 0.001

Dermal (External dose) mg/kg bw/day:	Inhalation event/Exposure mg/m³ (Short term exposure):	Dermal systemic exposure (external dose) with gloves (90% efficiency) mg/kg bw/day (Long term exposure):	Inhalation (mg/kg/day) Long term exposure:
0.002; 0.001; 5E-4; 0.001	11.2; 3.0; 11.5; 3.1	0.0002; 0.0001; 5E-5; 0.0001	0.039; 0.188; 0.040; 0.191

Section 3.2 Exposure estimation-Consumers

Contributing exposure scenario controlling worker exposure for 0:

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Systemic, Oral	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Systemic, Dermal	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Systemic, Inhalable		Not applicable.	Not applicable.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Systemic, Oral	Not applicable.	Not applicable.	Not applicable.

Section 3.3 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1:

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.382	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231; Regional PEC: 6.87x10-13	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94; Regional PEC natural soil: 3.75x10-4	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	0.138	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	1.06x10-4	8.25x10-3; Regional PEC: 8.19x10-3	EUSES calculation
Marine water mg/l	1.38x10-4	9.39x10-4; Regional PEC: 8.03x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.64; Regional PEC: 4.43	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.300; Regional PEC: 0.371	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	4.33x10-11	3.75x10-4; Regional PEC: 3.71x10-4	EUSES calculation
Grassland averaged mg/kg dwt	8.43x10-11	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	7.32x10-13	Not evaluated.	EUSES calculation
Annual average mg/m³	7.32x10-13	1.42x10-12	EUSES calculation
Annual deposition mg/m2/d	3.71x10-12	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to Downstream User to evaluate if he works inside the boundaries set by the ES

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional guidance	Not applicable.

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Handling of solid products with small amounts of unbound ethylenamines - Use of preparations containing EA up to 0.5% - Professional **Process Category:** PROC21, PROC24 **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC06d
List of use descriptors	**Identified use name:** Handling of solid products with small amounts of unbound ethylenamines - Use of preparations containing EA up to 0.5% - Professional **Process Category:** PROC21, PROC24 **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC06d

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Low energy manipulation of substances bound in materials and/or articles

Product Characteristics:	Solid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Not applicable.
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: High (mechanical) energy work-up of substances bound in materials and/or articles

Product Characteristics:	Solid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Not applicable.
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	4840
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	967
Average Local Daily Tonnage (kg/day):	2649
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.

Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Laboratory chemicals

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	100
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	20.1
Average Local Daily Tonnage (kg/day):	55.1
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.02
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.

Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 4: Use of coatings and adhesives

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	0
Release fraction to soil from process (initial release prior to RMM):	5.00x10-3
Release fraction to wastewater from process (initial release prior to RMM):	0.01
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Low energy manipulation of substances bound in materials and/or articles

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.001	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.06	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.12	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: High (mechanical) energy work-up of substances bound in materials and/or articles

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.001	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.06	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.12	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.027	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.

	Value	Justification
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	4.35x10-4	8.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	8.48x10-4	1.22x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.29x10-5	EUSES calculation
	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	7.37x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	7.37x10-6	7.37x10-6	EUSES calculation
Annual deposition mg/m2/d	3.74x10-5	Not evaluated.	EUSES calculation
	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	Justification	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.

	Value	Justification
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Laboratory chemicals

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.022	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.10x10-5	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.

	Value	Justification
Concentration in sewage (PECstp) mg/l	7.96x10-3	EUSES calculation
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	6.09x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	7.92x10-6	8.10x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.259	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	1.81x10-7	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.52x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	3.06x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	3.06x10-9	3.06x10-9	EUSES calculation
Annual deposition mg/m2/d	1.55x10-8	Not evaluated.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 4: Use of coatings and adhesives

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.010	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	3.68x10-3	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.82x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	3.67x10-6	8.06x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.258	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.15x10-12	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	2.25x10-12	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.95x10-14	Not evaluated.	EUSES calculation
Annual average mg/m³	1.95x10-14	7.07x10-13	EUSES calculation
Annual deposition mg/m2/d	9.90	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Handling of solid products with small amounts of unbound ethylenamines - Use of preparations containing EA up to 2% - Professional **Process Category:** PROC21, PROC24 **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC06d
List of use descriptors	**Identified use name:** Handling of solid products with small amounts of unbound ethylenamines - Use of preparations containing EA up to 2% - Professional **Process Category:** PROC21, PROC24 **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC06d

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Low energy manipulation of substances bound in materials and/or articles

Product Characteristics:	Solid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Not applicable.
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: High (mechanical) energy work-up of substances bound in materials and/or articles

Product Characteristics:	Solid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Not applicable.
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	4840
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	967
Average Local Daily Tonnage (kg/day):	2649
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.

Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Laboratory chemicals

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	100
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	20.1
Average Local Daily Tonnage (kg/day):	55.1
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.02
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.

Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 4: Use of coatings and adhesives

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	0
Release fraction to soil from process (initial release prior to RMM):	5.00x10-3
Release fraction to wastewater from process (initial release prior to RMM):	0.01
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Low energy manipulation of substances bound in materials and/or articles

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0003	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.02	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.03	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: High (mechanical) energy work-up of substances bound in materials and/or articles

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.027	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.

	Value	Justification
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	4.35x10-4	8.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	8.48x10-4	1.22x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.29x10-5	EUSES calculation
	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	7.37x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	7.37x10-6	7.37x10-6	EUSES calculation
Annual deposition mg/m2/d	3.74x10-5	Not evaluated.	EUSES calculation
	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	Justification	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.

	Value	Justification
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Laboratory chemicals

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.022	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.10x10-5	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.

	Value	Justification
Concentration in sewage (PECstp) mg/l	7.96x10-3	EUSES calculation
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	6.09x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	7.92x10-6	8.10x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.259	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	1.81x10-7	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.52x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	3.06x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	3.06x10-9	3.06x10-9	EUSES calculation
Annual deposition mg/m2/d	1.55x10-8	Not evaluated.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 4: Use of coatings and adhesives

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.010	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	3.68x10-3	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.82x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	3.67x10-6	8.06x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.258	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.15x10-12	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	2.25x10-12	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.95x10-14	Not evaluated.	EUSES calculation
Annual average mg/m³	1.95x10-14	7.07x10-13	EUSES calculation
Annual deposition mg/m2/d	9.90x10-14	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 100% - Industrial **Process Category:** PROC01, PROC02, PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC15 **Substance supplied to that use in form of:** As such **Sector of end use:** SU03 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC06a
List of use descriptors	**Identified use name:** Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 100% - Industrial **Process Category:** PROC01, PROC02, PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC15 **Substance supplied to that use in form of:** As such **Sector of end use:** SU03 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC06a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Use in closed process, no likelihood of exposure

Product Characteristics:	Liquid. Covers percentage substance in the product up to 100%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Use in closed, continuous process with occasional controlled exposure

Product Characteristics:	Liquid. Covers percentage substance in the product up to 100%
Amounts used:	Not applicable.
Frequency and duration of use:	Avoid carrying out operation for more than 4 hours.
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 2: Use in closed batch process (synthesis or formulation)

Product Characteristics:	Liquid. Covers percentage substance in the product up to 100%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear appropriate respiratory protection. with a minimum efficacy of 90%

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 3: Use in batch and other process (synthesis) where opportunity for exposure arises

Product Characteristics:	Liquid. Covers percentage substance in the product up to 100%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear appropriate respiratory protection. with a minimum efficacy of 90%

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 4: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Product Characteristics:	Liquid. Covers percentage substance in the product up to 100%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear appropriate respiratory protection. with a minimum efficacy of 90%

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 5: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers percentage substance in the product up to 100%
Amounts used:	Not applicable.
Frequency and duration of use:	Avoid carrying out operation for more than 1 hour.
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.

Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear appropriate respiratory protection. with a minimum efficacy of 95%

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 6: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product Characteristics:	Liquid. Covers percentage substance in the product up to 100%
Amounts used:	Not applicable.
Frequency and duration of use:	Avoid carrying out operation for more than 4 hours.
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 7: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product Characteristics:	Liquid. Covers percentage substance in the product up to 100%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear appropriate respiratory protection. with a minimum efficacy of 90%

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 8: Use as laboratory reagent

Product Characteristics:	Liquid. Covers percentage substance in the product up to 100%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear appropriate respiratory protection. with a minimum efficacy of 90%

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Manufacture of substances

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1.86x10-4
Fraction of Regional tonnage used locally:	3.72x10-3
Annual site tonnage (tonnes/year):	3.72x10-3
Average Local Daily Tonnage (kg/day):	10192
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	1x10-4
Release fraction to wastewater from process (initial release prior to RMM):	1.61x10-8
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Contributing exposure scenario controlling environmental exposure for 1: Use as an intermediate

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1.86x10-4
Fraction of Regional tonnage used locally:	3.72x10-3
Annual site tonnage (tonnes/year):	3.72x10-3
Average Local Daily Tonnage (kg/day):	10192
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	1x10-4
Release fraction to wastewater from process (initial release prior to RMM):	1.61x10-8
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Contributing exposure scenario controlling environmental exposure for 2: Formulation of preparations*

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	3720
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	744
Average Local Daily Tonnage (kg/day):	2000
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	0
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Manufacture of coatings, adhesives and inks (and powder products)

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	3720
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	744
Average Local Daily Tonnage (kg/day):	2038
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1.1x10-3
Release fraction to soil from process (initial release prior to RMM):	0

Release fraction to wastewater from process (initial release prior to RMM):	5.0x10-5
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Use in closed process, no likelihood of exposure

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	1.1	0.007	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	1.1	0.06	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	1.1	0.12	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Use in closed, continuous process with occasional controlled exposure

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 2: Use in closed batch process (synthesis or formulation)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 3: Use in batch and other process (synthesis) where opportunity for exposure arises

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	1.3	0.14	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	1.3	0.30	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	1.3	0.62	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 4: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	1.4	0.27	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	1.4	0.30	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	1.4	0.60	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 5: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	1.5	0.27	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	1.5	0.37	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	1.5	0.74	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 6: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	1.2	0.14	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	1.2	0.548	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	1.2	0.55	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 7: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	1.3	0.14	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	1.3	0.30	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	1.3	0.62	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 8: Use as laboratory reagent

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Manufacture of substances

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	1.64x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.102	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	5.93x10-5	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	5.9x10-8	8.15x10-3	EUSES calculation
Marine water mg/l	5.9x10-8	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.67x10-3	2.05x10-3	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-3	3.64x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	3.28x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	2.83x10-5	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-5	2.83x10-5	EUSES calculation
Annual deposition mg/m2/d	1.44x10-4	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an intermediate

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	1064x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.102	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	5.93x10-5	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	5.9x10-8	8.15x10-3	EUSES calculation
Marine water mg/l	5.9x10-8	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.67x10-3	2.05x10-3	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-3	3.64x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	3.28x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	2.83x10-5	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-5	2.83x10-5	EUSES calculation
Annual deposition mg/m2/d	1.44x10-4	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Formulation of preparations*

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.020	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	3.35x10-4	7.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	6.52x10-4	1.03x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.13x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**

During emission mg/m³	5.67x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	5.67x10-6	5.67x10-6	EUSES calculation
Annual deposition mg/m2/d	2.87x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Manufacture of coatings, adhesives and inks (and powder products)

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0.102	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.0204	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	0.037	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.82x10-5	8.17x10-3	EUSES calculation
Marine water mg/l	3.76x10-5	8.39x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.268	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	3.35x10-4	7.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	6.52x10-4	1.03x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.13x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	5.67x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	5.67x10-6	5.67x10-6	EUSES calculation
Annual deposition mg/m2/d	2.87x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 2% - Industrial **Process Category:** PROC05, PROC08a, PROC08b, PROC09 **Substance supplied to that use in form of:** As such **Sector of end use:** SU03 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC06a
List of use descriptors	**Identified use name:** Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 2% - Industrial **Process Category:** PROC05, PROC08a, PROC08b, PROC09 **Substance supplied to that use in form of:** As such **Sector of end use:** SU03 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC06a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 2: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Manufacture of substances

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1.86x10-4
Fraction of Regional tonnage used locally:	3.72x10-3
Annual site tonnage (tonnes/year):	3.72x10-3
Average Local Daily Tonnage (kg/day):	10192
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	1x10-4
Release fraction to wastewater from process (initial release prior to RMM):	1.61x10-8
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7

Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Contributing exposure scenario controlling environmental exposure for 1: Use as an intermediate

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1.86x10-4
Fraction of Regional tonnage used locally:	3.72x10-3
Annual site tonnage (tonnes/year):	3.72x10-3
Average Local Daily Tonnage (kg/day):	10192
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	1x10-4
Release fraction to wastewater from process (initial release prior to RMM):	1.61x10-8
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Contributing exposure scenario controlling environmental exposure for 2: Formulation of preparations*

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	3720
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	744
Average Local Daily Tonnage (kg/day):	2000
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	0
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0

Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Manufacture of coatings, adhesives and inks (and powder products)

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	3720
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	744
Average Local Daily Tonnage (kg/day):	2038
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1.1x10-3
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	5.0x10-5
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	2.1	0.005	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	2.1	0.61	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.

Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	2.1	1.22	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	2.2	0.005	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	2.2	0.31	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	2.2	0.61	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 2: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Manufacture of substances

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	1.64x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.102	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation

	Value	Justification
Concentration in sewage (PECstp) mg/l	5.93x10-5	EUSES calculation
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	5.9x10-8	8.15x10-3	EUSES calculation
Marine water mg/l	5.9x10-8	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	1.67x10-3	2.05x10-3	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-3	3.64x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	3.28x10-5	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	2.83x10-5	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-5	2.83x10-5	EUSES calculation
Annual deposition mg/m2/d	1.44x10-4	Not evaluated.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an intermediate

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	1.64x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.102	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	5.93x105	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	5.9x10-8	8.15x10-3	EUSES calculation
Marine water mg/l	5.9x10-8	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.67x10-3	2.05x10-3	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-3	3.64x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	3.28x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	2.83x10-5	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-5	2.83x10-5	EUSES calculation
Annual deposition mg/m2/d	1.44x10-4	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Formulation of preparations*

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.020	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	3.35x10-4	7.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	6.52x10-4	1.03x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.13x10-5	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	5.67x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	5.67x10-6	5.67x10-6	EUSES calculation
Annual deposition mg/m2/d	2.87x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Manufacture of coatings, adhesives and inks (and powder products)

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.102	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.0204	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	0.037	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.82x10-5	8.17x10-3	EUSES calculation
Marine water mg/l	3.76x10-5	8.39x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.268	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	3.35x10-4	7.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	6.52x10-4	1.03x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.13x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	5.67x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	5.67x10-6	5.67x10-6	EUSES calculation
Annual deposition mg/m2/d	2.87x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 0.5% - Industrial **Process Category:** PROC05, PROC08a, PROC08b, PROC09 **Substance supplied to that use in form of:** As such **Sector of end use:** SU03 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC06a
List of use descriptors	**Identified use name:** Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 0.5% - Industrial **Process Category:** PROC05, PROC08a, PROC08b, PROC09 **Substance supplied to that use in form of:** As such **Sector of end use:** SU03 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC06a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 2: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Manufacture of substances

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1.86x10-4
Fraction of Regional tonnage used locally:	3.72x10-3
Annual site tonnage (tonnes/year):	3.72x10-3
Average Local Daily Tonnage (kg/day):	10192
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	1x10-4
Release fraction to wastewater from process (initial release prior to RMM):	1.61x10-8
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7

Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Contributing exposure scenario controlling environmental exposure for 1: Use as an intermediate

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1.86x10-4
Fraction of Regional tonnage used locally:	3.72x10-3
Annual site tonnage (tonnes/year):	3.72x10-3
Average Local Daily Tonnage (kg/day):	10192
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	1x10-4
Release fraction to wastewater from process (initial release prior to RMM):	1.61x10-8
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Contributing exposure scenario controlling environmental exposure for 2: Formulation of preparations*

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	3720
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	744
Average Local Daily Tonnage (kg/day):	2000
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	0
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0

Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Manufacture of coatings, adhesives and inks (and powder products)

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	3720
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	744
Average Local Daily Tonnage (kg/day):	2038
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1.1x10-3
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	5.0x10-5
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.

Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	3.1	0.001	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	3.1	0.76	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	3.1	1.52	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 2: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Manufacture of substances

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	1.64x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.102	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	5.93x10-5	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	5.9x10-8	8.15x10-3	EUSES calculation
Marine water mg/l	5.9x10-8	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.67x10-3	2.05x10-3	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-3	3.64x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	3.28x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	2.83x10-5	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-5	2.83x10-5	EUSES calculation
Annual deposition mg/m2/d	1.44x10-4	Not evaluated.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an intermediate

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	1.64x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.102	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation

	Value	Justification
Concentration in sewage (PECstp) mg/l	5.93x10-5	EUSES calculation
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	5.9x10-8	8.15x10-3	EUSES calculation
Marine water mg/l	5.9x10-8	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	1.67x10-3	2.05x10-3	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-3	3.64x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	3.28x10-5	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	2.83x10-5	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-5	2.83x10-5	EUSES calculation
Annual deposition mg/m2/d	1.44x10-4	Not evaluated.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Formulation of preparations*

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.020	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation

	Value	Justification
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	3.35x10-4	7.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	6.52x10-4	1.03x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.13x10-5	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	5.67x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	5.67x10-6	5.67x10-6	EUSES calculation
Annual deposition mg/m2/d	2.87x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Manufacture of coatings, adhesives and inks (and powder products)

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.102	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.0204	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	0.037	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.82x10-5	8.17x10-3	EUSES calculation
Marine water mg/l	3.76x10-5	8.39x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.268	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	3.35x10-4	7.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	6.52x10-4	1.03x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.13x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	5.67x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	5.67x10-6	5.67x10-6	EUSES calculation
Annual deposition mg/m2/d	2.87x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Professional

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 2% - Professional **Process Category:** PROC08a, PROC05 **Substance supplied to that use in form of:** As such **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC06a
List of use descriptors	**Identified use name:** Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 2% - Professional **Process Category:** PROC08a, PROC05 **Substance supplied to that use in form of:** As such **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC06a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Manufacture of substances

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1.86x10-4
Fraction of Regional tonnage used locally:	3.72x10-3
Annual site tonnage (tonnes/year):	3.72x10-3
Average Local Daily Tonnage (kg/day):	10192
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	1x10-4
Release fraction to wastewater from process (initial release prior to RMM):	1.61x10-8
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Contributing exposure scenario controlling environmental exposure for 1: Use as an intermediate

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1.86x10-4
Fraction of Regional tonnage used locally:	3.72x10-3
Annual site tonnage (tonnes/year):	3.72x10-3
Average Local Daily Tonnage (kg/day):	10192
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	1x10-4
Release fraction to wastewater from process (initial release prior to RMM):	1.61x10-8
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.

Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Contributing exposure scenario controlling environmental exposure for 2: Formulation of preparations*

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	3720
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	744
Average Local Daily Tonnage (kg/day):	2000
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	0
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Manufacture of coatings, adhesives and inks (and powder products)

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	3720
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	744
Average Local Daily Tonnage (kg/day):	2038
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	225
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1.1x10-3

Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	5.0x10-5
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	2.2	0.005	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	2.2	0.31	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	2.2	0.61	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	2.1	0.005	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	2.1	0.61	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal		Not applicable.	

	Not applicable		Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	2.1	1.22	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Manufacture of substances

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	1.64x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.102	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	5.93x10-5	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	5.9x10-8	8.15x10-3	EUSES calculation
Marine water mg/l	5.9x10-8	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.67x10-3	2.05X10-3	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-3	3.64x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	3.28x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	2.83x10-5	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-5	2.83x10-5	EUSES calculation
Annual deposition mg/m2/d	1.44x10-4	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an intermediate

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	1.64x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.102	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	5.93x10-5	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	5.9x10-8	8.15x0-3	EUSES calculation

Marine water mg/l	5.9x10-8	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.67x10-3	2.05X10-3	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-3	3.64x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	3.28x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	2.83x10-5	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-5	2.83x10-5	EUSES calculation
Annual deposition mg/m2/d	1.44x10-4	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Formulation of preparations*

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.020	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	3.35x10-4	7.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	6.52x10-4	1.03x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.13x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	5.67x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	5.67x10-6	5.67x10-6	EUSES calculation
Annual deposition mg/m2/d	2.87x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Manufacture of coatings, adhesives and inks (and powder products)

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0.102	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.0204	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	

Concentration in sewage (PECstp) mg/l	0.037	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.82x10-5	8.17x10-3	EUSES calculation
Marine water mg/l	3.76x10-5	8.39x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.268	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	3.35x10-4	7.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	6.52x10-4	1.03x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.13x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	5.67x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	5.67x10-6	5.67x10-6	EUSES calculation
Annual deposition mg/m2/d	2.87x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Professional

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 0.5% - Professional **Process Category:** PROC08a **Substance supplied to that use in form of:** As such **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC06a
List of use descriptors	**Identified use name:** Use of ethylenamines in closed system with little opportunity for exposure - Use of preparations containing EA up to 0.5% - Professional **Process Category:** PROC08a **Substance supplied to that use in form of:** As such **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC06a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Manufacture of substances

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1.86x10-4
Fraction of Regional tonnage used locally:	3.72x10-3
Annual site tonnage (tonnes/year):	3.72x10-3
Average Local Daily Tonnage (kg/day):	10192
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting

Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	1x10-4
Release fraction to wastewater from process (initial release prior to RMM):	1.61x10-8
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Contributing exposure scenario controlling environmental exposure for 1: Use as an intermediate

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1.86x10-4
Fraction of Regional tonnage used locally:	3.72x10-3
Annual site tonnage (tonnes/year):	3.72x10-3
Average Local Daily Tonnage (kg/day):	10192
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	1x10-4
Release fraction to wastewater from process (initial release prior to RMM):	1.61x10-8
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Contributing exposure scenario controlling environmental exposure for 2: Formulation of preparations*

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	3720
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	744
Average Local Daily Tonnage (kg/day):	2000
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	0
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Manufacture of coatings, adhesives and inks (and powder products)

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	3720
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	744
Average Local Daily Tonnage (kg/day):	2038
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	225
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	Indoor. industrial setting
Release fraction to air from process (initial release prior to RMM):	1.1x10-3
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	5.0x10-5
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to municipal sewage treatment plant:	
Assumed domestic sewage treatment plant flow (m3/d):	2000

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.001	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.76	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.52	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Manufacture of substances

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	1.64x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.102	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation

	Value	Justification
Concentration in sewage (PECstp) mg/l	5.93x10-5	EUSES calculation
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	5.9x10-8	8.15x10-3	EUSES calculation
Marine water mg/l	5.9x10-8	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	1.67x10-3	2.05x10-3	EUSES calculation

Grassland averaged mg/kg dwt	3.26x10-3	3.64x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	3.28x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	2.83x10-5	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-5	2.83x10-5	EUSES calculation
Annual deposition mg/m2/d	1.44x10-4	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an intermediate

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	1.64x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.102	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	5.93x10-5	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	5.9x10-8	8.15x10-3	EUSES calculation
Marine water mg/l	5.9x10-8	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.67x10-3	2.05x10-3	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-3	3.64x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	3.28x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	2.83x10-5	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-5	2.83x10-5	EUSES calculation
Annual deposition mg/m2/d	1.44x10-4	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Formulation of preparations*

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.020	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation

Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	3.35x10-4	7.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	6.52x10-4	1.03x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.13x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	5.67x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	5.67x10-6	5.67x10-6	EUSES calculation
Annual deposition mg/m2/d	2.87x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Manufacture of coatings, adhesives and inks (and powder products)

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0.102	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.0204	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	0.037	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.82x10-5	8.17x10-3	EUSES calculation
Marine water mg/l	3.76x10-5	8.39x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable	Not applicable	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.268	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	3.35x10-4	7.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	6.52x10-4	1.03x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.13x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	5.67x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	5.67x10-6	5.67x10-6	EUSES calculation
Annual deposition mg/m2/d	2.87x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 25% - Industrial **Process Category:** PROC05, PROC08a, PROC08b, PROC09 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU03 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a
List of use descriptors	**Identified use name:** Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 25% - Industrial **Process Category:** PROC05, PROC08a, PROC08b, PROC09 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU03 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Product Characteristics:	Liquid. Covers percentage substance in the product up to 25%.
Amounts used:	Not applicable.
Frequency and duration of use:	Exposure duration per day: 15 min to <1 hour(s)
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers percentage substance in the product up to 25%.
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 2: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product Characteristics:	Liquid. Covers percentage substance in the product up to 25%.
Amounts used:	Not applicable.
Frequency and duration of use:	Avoid carrying out operation for more than 1 hour.
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product Characteristics:	Liquid. Covers percentage substance in the product up to 25%.
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	4840
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	967
Average Local Daily Tonnage (kg/day):	2649
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
	0

Release fraction to wastewater from process (initial release prior to RMM):	
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Lube oil use

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1300
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	260
Average Local Daily Tonnage (kg/day):	1182
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	220
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-3
Release fraction to wastewater from process (initial release prior to RMM):	1.00x10-3
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 4: Laboratory chemicals

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	100
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	20.1
Average Local Daily Tonnage (kg/day):	55.1
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	

Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.02
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 5: Use of coatings and adhesives

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0685714	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.3656 0.365575	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.73115	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0685714	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.365575 0.45697	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.73115 0.91393	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 2: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.034286	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.548325	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.096725	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0685714	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.365575	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.

Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.73115	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.027	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	4.35x10-4	8.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	8.48x10-4	1.22x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.29x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	7.37x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	7.37x10-6	7.37x10-6	EUSES calculation
Annual deposition mg/m2/d	3.74x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.

	Value	Justification
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.

	Value	Justification
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Lube oil use

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	8.49x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	8.49x10-6	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	3.07x10-4	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.35x10-7	8.15x10-3	EUSES calculation
Marine water mg/l	3.05x10-7	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.257	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	8.40x10-8	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	1.64x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	2.36x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	1.42x10-9	1.42x10-9	EUSES calculation
Annual deposition mg/m2/d	7.21x10-9	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 4: Laboratory chemicals

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.022	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.10x10-5	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	7.96x10-3	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	6.09x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	7.92x10-6	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.259	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.81x10-7	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.52x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**

During emission mg/m³	3.06x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	3.06x10-9	3.06x10-9	EUSES calculation
Annual deposition mg/m2/d	1.55x10-8	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 5: Use of coatings and adhesives

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.012	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.67x10-4	5.42x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-4	7.01x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	8.61x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	3.45x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-6	2.83x10-6	EUSES calculation
Annual deposition mg/m2/d	1.44x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 15% - Industrial **Process Category:** PROC05, PROC06, PROC07, PROC08a, PROC08b, PROC09, PROC13, PROC14 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU03 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a
List of use descriptors	**Identified use name:** Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 15% - Industrial **Process Category:** PROC05, PROC06, PROC07, PROC08a, PROC08b, PROC09, PROC13, PROC14 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU03 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Product Characteristics:	Liquid. Covers concentrations up to 15%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Calendering operations

Product Characteristics:	Liquid. Covers concentrations up to 15%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 2: Industrial spraying

Product Characteristics:	Liquid. Covers concentrations up to 15%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear appropriate respiratory protection. with a minimum efficacy of 90%

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 15%
Amounts used:	Not applicable.
Frequency and duration of use:	Exposure duration per day: 1-4 hour(s)
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 4: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 15%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 5: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product Characteristics:	Liquid. Covers concentrations up to 15%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.

Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 6: Treatment of articles by dipping and pouring

Product Characteristics:	Liquid. Covers concentrations up to 15%
Amounts used:	Not applicable.
Frequency and duration of use:	Exposure duration per day: 1-4 hour(s)
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 7: Production of preparations* or articles by tabletting, compression, extrusion, pelletisation

Product Characteristics:	Liquid. Covers concentrations up to 15%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	4840
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	967
Average Local Daily Tonnage (kg/day):	2649
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.

Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5

Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Lube oil use

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1300
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	260
Average Local Daily Tonnage (kg/day):	1182
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	220
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-3
Release fraction to wastewater from process (initial release prior to RMM):	1.00x10-3
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 4: Laboratory chemicals

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	100
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	20.1
Average Local Daily Tonnage (kg/day):	55.1

Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.02
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 5: Use of coatings and adhesives

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0822	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.457	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.914	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Calendering operations

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0822	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.457	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.914	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 2: Industrial spraying

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.1286	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.457	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.914	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0411	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.457 0.548	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.

Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.914 1.097	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 4: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0822	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.457	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.914	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 5: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0822	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Long term exposure, Systemic, Inhalable	Not applicable.	0.457	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.914	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 6: Treatment of articles by dipping and pouring

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0411	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.548	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.097	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 7: Production of preparations* or articles by tabletting, compression, extrusion, pelletisation

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0822	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.457	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.914	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.027	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	4.35x10-4	8.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	8.48x10-4	1.22x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.29x10-5	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	7.37x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	7.37x10-6	7.37x10-6	EUSES calculation
Annual deposition mg/m2/d	3.74x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.9x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**

Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Lube oil use

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	8.49x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	8.49x10-6	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	3.07x10-4	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.35x10-7	8.15x10-3	EUSES calculation
Marine water mg/l	3.05x10-7	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.257	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	8.40x10-8	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	1.64x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	2.36x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	1.42x10-9	1.42x10-9	EUSES calculation
Annual deposition mg/m2/d	7.21x10-9	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 4: Laboratory chemicals

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0.022	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.10x10-5	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	7.96x10-3	EUSES calculation	

Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	6.09x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	7.92x10-6	8.10x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.259	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.81x10-7	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.52x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	3.06x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	3.06x10-9	3.06x10-9	EUSES calculation
Annual deposition mg/m2/d	1.55x10-8	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 5: Use of coatings and adhesives

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.012	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.67x10-4	5.42x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-4	7.01x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	8.61x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	3.45x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-6	2.83x10-6	EUSES calculation
Annual deposition mg/m2/d	1.44x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 2% - Industrial **Process Category:** PROC05, PROC06, PROC07, PROC08a, PROC08b, PROC09, PROC10, PROC13, PROC14, PROC19 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU03 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a
List of use descriptors	**Identified use name:** Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 2% - Industrial **Process Category:** PROC05, PROC06, PROC07, PROC08a, PROC08b, PROC09, PROC10, PROC13, PROC14, PROC19 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU03 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Calendering operations

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.

Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 2: Industrial spraying

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear appropriate respiratory protection. with a minimum efficacy of 90%

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 4: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 5: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.

Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 6: Roller application or brushing

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 7: Treatment of articles by dipping and pouring

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 8: Production of preparations* or articles by tabletting, compression, extrusion, pelletisation

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 9: Hand-mixing with intimate contact and only PPE available

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	4840
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	967
Average Local Daily Tonnage (kg/day):	2649
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.

Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Lube oil use

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1300
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	260
Average Local Daily Tonnage (kg/day):	1182
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	220
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-3
Release fraction to wastewater from process (initial release prior to RMM):	1.00x10-3
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 4: Laboratory chemicals

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	100
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	20.1
Average Local Daily Tonnage (kg/day):	55.1
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.02
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 5: Use of coatings and adhesives

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.05	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.61	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.

Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.22	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Calendering operations

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.05	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.61	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.22	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 2: Industrial spraying

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.09	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.22	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 4: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.05 0.09	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.61	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.22	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 5: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.05	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.61	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 6: Roller application or brushing

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.09	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.61	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.22	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 7: Treatment of articles by dipping and pouring

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 8: Production of preparations* or articles by tabletting, compression, extrusion, pelletisation

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 9: Hand-mixing with intimate contact and only PPE available

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.

Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.027	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	4.35x10-4	8.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	8.48x10-4	1.22x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.29x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	7.37x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	7.37x10-6	7.37x10-6	EUSES calculation
Annual deposition mg/m2/d	3.74x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Lube oil use

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	8.49x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	8.49x10-6	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	Justification	
Concentration in sewage (PECstp) mg/l	3.07x10-4	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	2.35x10-7	8.15x10-3	EUSES calculation
Marine water mg/l	3.05x10-7	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.257	EUSES calculation
	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	8.40x10-8	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	1.64x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.914x10-6	EUSES calculation
	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	2.36x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	1.42x10-9	1.42x10-9	EUSES calculation
Annual deposition mg/m2/d	7.21x10-9	Not evaluated.	EUSES calculation
	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 4: Laboratory chemicals

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.022	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.10x10-5	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	Justification	
Concentration in sewage (PECstp) mg/l	7.96x10-3	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	6.09x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	7.92x10-6	8.10x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation

Marine water sediment mg/kg dwt	Not evaluated.	0.259	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.81x10-7	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.52x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	3.06x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	3.06x10-9	3.06x10-9	EUSES calculation
Annual deposition mg/m2/d	1.55x10-8	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 5: Use of coatings and adhesives

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.012	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.67x10-4	5.42x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-4	7.01x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	8.61x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	3.45x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-6	2.83x10-6	EUSES calculation
Annual deposition mg/m2/d	1.44x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition UVCB

Product name Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario

Identified use name: Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 0.5% - Industrial
Process Category: PROC05, PROC07, PROC08a, PROC08b, PROC09, PROC10, PROC13, PROC14
Substance supplied to that use in form of: In a mixture
Sector of end use: SU03, SU22
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a

List of use descriptors

Identified use name: Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 0.5% - Industrial
Process Category: PROC05, PROC07, PROC08a, PROC08b, PROC09, PROC10, PROC13, PROC14
Substance supplied to that use in form of: In a mixture
Sector of end use: SU03, SU22
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. industrial setting and professional setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Industrial spraying

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.

Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 2: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. industrial setting and professional setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. industrial setting and professional setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 4: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. industrial setting and professional setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 5: Roller application or brushing

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. industrial setting and professional setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 6: Treatment of articles by dipping and pouring

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. industrial setting and professional setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 7: Production of preparations* or articles by tabletting, compression, extrusion, pelletisation

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work: 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. industrial setting and professional setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	4840
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	967
Average Local Daily Tonnage (kg/day):	2649
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Lube oil use

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1300
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	260
Average Local Daily Tonnage (kg/day):	1182
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	220
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-3
	1.00x10-3

Release fraction to wastewater from process (initial release prior to RMM):	
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 4: Laboratory chemicals

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	100
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	20.1
Average Local Daily Tonnage (kg/day):	55.1
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.02
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 5: Use of coatings and adhesives

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	

Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Industrial spraying

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 2: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 4: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 5: Roller application or brushing

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 6: Treatment of articles by dipping and pouring

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.

Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 7: Production of preparations* or articles by tabletting, compression, extrusion, pelletisation

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.027	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.

	Value	Justification
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation EUSES calculation
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	4.35x10-4	8.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	8.48x10-4	1.22x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.29x10-5	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	7.37x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	7.37x10-6	7.37x10-6	EUSES calculation
Annual deposition mg/m2/d	3.74x10-5	Not evaluated.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.

	Value	Justification
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation EUSES calculation
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Lube oil use

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	8.49x10-4	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	8.49x10-6	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	3.07x10-4	EUSES calculation EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.35x10-7	8.15x10-3	EUSES calculation
Marine water mg/l	3.05x10-7	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.257	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	8.40x10-8	3.75x10-4	EUSES calculation

Grassland averaged mg/kg dwt	1.64x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	2.36x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	1.42x10-9	1.42x10-9	EUSES calculation
Annual deposition mg/m2/d	7.21x10-9	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 4: Laboratory chemicals

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0.022	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.10x10-5	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	7.96x10-3	EUSES calculation EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	6.09x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	7.92x10-6	8.10x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.259	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.81x10-7	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.52x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	3.06x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	3.06x10-9	3.06x10-9	EUSES calculation
Annual deposition mg/m2/d	1.55x10-8	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 5: Use of coatings and adhesives

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.012	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation

Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.67x10-4	5.42x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.26x10-4	7.01x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	8.61x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	3.45x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	2.83x10-6	2.83x10-6	EUSES calculation
Annual deposition mg/m2/d	1.44x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Professional

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 25% - Professional **Process Category:** PROC05, PROC08a **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a
List of use descriptors	**Identified use name:** Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 25% - Professional **Process Category:** PROC05, PROC08a **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Product Characteristics:	Liquid. Covers concentrations up to 25%
Amounts used:	Not applicable.
Frequency and duration of use:	Exposure duration per day: 15 min to <1 hour(s)
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear appropriate respiratory protection. with a minimum efficacy of 95%

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 25%
Amounts used:	Not applicable.
Frequency and duration of use:	Avoid carrying out operation for more than 15 minutes.
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.

Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear appropriate respiratory protection. with a minimum efficacy of 95%

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	4840
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	967
Average Local Daily Tonnage (kg/day):	2649
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Laboratory chemicals

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	100
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	20.1
Average Local Daily Tonnage (kg/day):	55.1
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5

Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.02
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 4: Use of coatings and adhesives

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	0
Release fraction to soil from process (initial release prior to RMM):	5.00x10-3
Release fraction to wastewater from process (initial release prior to RMM):	0.01
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0685714	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.3656 0.365575	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.73115	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0685714	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.365575 0.45697	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.73115 0.91393	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.027	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	EUSES calculation
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	4.35x10-4	8.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	8.48x10-4	1.22x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.29x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	7.37x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	7.37x10-6	7.37x10-6	EUSES calculation
Annual deposition mg/m2/d	3.74x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation

Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	EUSES calculation
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	EUSES calculation
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Laboratory chemicals

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0.022	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.10x10-5	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	

Concentration in sewage (PECstp) mg/l	7.96x10-3	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	6.09x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	7.92x10-6	8.10x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	EUSES calculation
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.259	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.81x10-7	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.52x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	3.06x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	3.06x10-9	3.06x10-9	EUSES calculation
Annual deposition mg/m2/d	1.55x10-8	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 4: Use of coatings and adhesives

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0.010	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	3.68x10-3	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.82x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	3.67x10-6	8.06x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	EUSES calculation
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.258	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.15x10-12	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	2.25x10-12	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.95x10-14	Not evaluated.	EUSES calculation
Annual average mg/m³	1.95x10-14	7.07x10-13	EUSES calculation
Annual deposition mg/m2/d	9.90x10-14	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 15% - Professional **Process Category:** PROC08a, PROC10, PROC11 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a
List of use descriptors	**Identified use name:** Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 15% - Professional **Process Category:** PROC08a, PROC10, PROC11 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 15%
Amounts used:	Not applicable.
Frequency and duration of use:	Exposure duration per day: 15 min to <1 hour(s)
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Roller application or brushing

Product Characteristics:	Liquid. Covers concentrations up to 15%
Amounts used:	Not applicable.
Frequency and duration of use:	Exposure duration per day: 15 min to <1 hour(s)
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear appropriate respiratory protection. with a minimum efficacy of 95%

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 2: Non industrial spraying

Product Characteristics:	Liquid. Covers concentrations up to 10%
Amounts used:	Not applicable.
Frequency and duration of use:	Exposure duration per day: 15 min to <1 hour(s)
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	4840
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	967
Average Local Daily Tonnage (kg/day):	2649
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.

Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Laboratory chemicals

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	100
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	20.1
Average Local Daily Tonnage (kg/day):	55.1
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.02
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 4: Use of coatings and adhesives

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	0
Release fraction to soil from process (initial release prior to RMM):	5.00x10-3
Release fraction to wastewater from process (initial release prior to RMM):	0.01
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0411	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.548 0.457	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.097 0.914	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Roller application or brushing

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.0822	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.457	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.914	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 2: Non industrial spraying

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.214	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.121	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable.	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.243	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.027	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.

	Value	Justification
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation

Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	4.35x10-4	8.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	8.48x10-4	1.22x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.29x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	7.37x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	7.37x10-6	7.37x10-6	EUSES calculation
Annual deposition mg/m2/d	3.74x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Laboratory chemicals

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.022	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.10x10-5	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	7.96x10-3	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	6.09x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	7.92x10-6	8.10x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.259	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.81x10-7	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.52x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	3.06x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	3.06x10-9	3.06x10-9	EUSES calculation
Annual deposition mg/m2/d	1.55x10-8	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 4: Use of coatings and adhesives

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	Not applicable.	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	Not applicable.	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	3.68x10-3	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.82x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	3.67x10-6	8.06x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.258	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.15x10-12	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	2.25x10-12	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.95x10-14	Not evaluated.	EUSES calculation
Annual average mg/m³	1.95x10-14	7.07x10-3	EUSES calculation
Annual deposition mg/m2/d	9.90x10-14	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 2% - Professional **Process Category:** PROC08a, PROC11 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a
List of use descriptors	**Identified use name:** Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 2% - Professional **Process Category:** PROC08a, PROC11 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Non industrial spraying

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Avoid carrying out operation for more than 4 hours.
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear appropriate respiratory protection. with a minimum efficacy of 90%

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	4840
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	967
Average Local Daily Tonnage (kg/day):	2649
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Laboratory chemicals

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	100
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	20.1
Average Local Daily Tonnage (kg/day):	55.1
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.02

Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 4: Use of coatings and adhesives

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	0
Release fraction to soil from process (initial release prior to RMM):	5.00x10-3
Release fraction to wastewater from process (initial release prior to RMM):	0.01
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Non industrial spraying

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.21	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.15	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.30	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.027	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	4.35x10-4	8.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	8.48x10-4	1.22x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.29x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	7.37x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	7.37x10-6	7.37x10-6	EUSES calculation
Annual deposition mg/m2/d	3.74x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**

During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Laboratory chemicals

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0.022	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.10x10-5	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	7.96x10-3	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	6.09x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	7.92x10-6	8.10x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.259	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	1.81x10-7	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.52x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not evaluated.	EUSES calculation
Annual average mg/m³	Not applicable.	Not applicable.	EUSES calculation
Annual deposition mg/m2/d	Not applicable.	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 4: Use of coatings and adhesives

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.010	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	3.68x10-3	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.82x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	3.67x10-6	8.06x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.258	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.15x10-12	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	2.25x10-12	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.95x10-14	Not evaluated.	EUSES calculation
Annual average mg/m³	1.95x10-14	7.07x10-13	EUSES calculation
Annual deposition mg/m2/d	9.90x10-14	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Professional

Identification of the substance or mixture

Product definition UVCB

Product name Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario

Identified use name: Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 0.5% - Professional
Process Category: PROC08a, PROC11
Substance supplied to that use in form of: In a mixture
Sector of end use: SU22
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a

List of use descriptors

Identified use name: Use of ethylenamines in open processes with high exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 0.5% - Professional
Process Category: PROC08a, PROC11
Substance supplied to that use in form of: In a mixture
Sector of end use: SU22
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC01, ERC02, ERC04, ERC05, ERC06a, ERC06b, ERC06c, ERC06d, ERC08a, ERC08b, ERC08c, ERC08d, ERC08e, ERC08f, ERC11a

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Non industrial spraying

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	4840
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	967
Average Local Daily Tonnage (kg/day):	2649
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1240
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 3: Laboratory chemicals

Operational conditions: Indoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	100
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	20.1
Average Local Daily Tonnage (kg/day):	55.1
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.02

Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 4: Use of coatings and adhesives

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	0
Release fraction to soil from process (initial release prior to RMM):	5.00x10-3
Release fraction to wastewater from process (initial release prior to RMM):	0.01
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Non industrial spraying

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.11	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.30	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.22	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Ashless dispersant

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0.027	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	4.35x10-4	8.10x10-4	EUSES calculation
Grassland averaged mg/kg dwt	8.48x10-4	1.22x10-3	EUSES calculation
Groundwater mg/l	Not evaluated.	1.29x10-5	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	7.37x10-6	Not evaluated.	EUSES calculation
Annual average mg/m³	7.37x10-6	7.37x10-6	EUSES calculation
Annual deposition mg/m2/d	3.74x10-5	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use as an epoxy curing agent

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**

During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Epoxy curing agent in paint

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	0	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	0	Not evaluated.	EUSES calculation
Annual average mg/m³	0	6.87x10-13	EUSES calculation
Annual deposition mg/m2/d	0	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 3: Laboratory chemicals

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0.022	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.10x10-5	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	7.96x10-3	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	6.09x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	7.92x10-6	8.10x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.257	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	1.81x10-7	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.52x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	3.06x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	3.06x10-9	3.06x10-9	EUSES calculation
Annual deposition mg/m2/d	1.55x10-8	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 4: Use of coatings and adhesives

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.010	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	0	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	3.68x10-3	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	2.82x10-6	8.15x10-3	EUSES calculation
Marine water mg/l	3.67x10-6	8.06x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.259	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.15x10-12	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	2.25x10-12	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.95x10-14	Not evaluated.	EUSES calculation
Annual average mg/m³	1.95x10-14	7.07x10-13	EUSES calculation
Annual deposition mg/m2/d	9.90x10-14	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of preparations containing ethylenamines in open processes with low exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 2% - Industrial **Process Category:** PROC05, PROC06, PROC08a, PROC08b, PROC09, PROC13, PROC16 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU03, SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC04, ERC08a, ERC08b, ERC08d, ERC10b
List of use descriptors	**Identified use name:** Use of preparations containing ethylenamines in open processes with low exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 2% - Industrial **Process Category:** PROC05, PROC06, PROC08a, PROC08b, PROC09, PROC13, PROC16 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU03, SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC04, ERC08a, ERC08b, ERC08d, ERC10b

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Calendering operations

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.

Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 2: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 4: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 5: Treatment of articles by dipping and pouring

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 6: Using material as fuel sources, limited exposure to unburned product to be expected

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 7: Roller application or brushing

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Fuel additive.

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.

Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use in detergents and cleaners, including professional

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.185
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Wood preservative.

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	2420
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	484
Average Local Daily Tonnage (kg/day):	1326
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0.02
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.055	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.61	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Local, Dermal	Not applicable	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	1.22	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Calendering operations

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.055	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.61	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	1.22	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 2: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.110	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.305	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	0.61	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.055	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.61	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	1.22	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 4: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.055	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.61	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	1.22	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 5: Treatment of articles by dipping and pouring

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	0.61	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 6: Using material as fuel sources, limited exposure to unburned product to be expected

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 7: Roller application or brushing

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Fuel additive.

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	5.10x10-6	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	8.37x10-8	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	1.63x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.42x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	1.42x10-9	1.42x10-9	EUSES calculation
Annual deposition mg/m2/d	7.18x10-9	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use in detergents and cleaners, including professional

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	11.5	547	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	4.6x10-4	0.116	EUSES calculation
Soil (direct releases only)	Not evaluated.	5.96	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	4.14	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	3.17x10-3	9.5x10-3	EUSES calculation
Marine water mg/l	4.7x10-3	4.8x10-3	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	1.4	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.39	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not evaluated.	3.38x10-4	EUSES calculation
Grassland averaged mg/kg dwt	Not evaluated.	3.3x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	9.2x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.3x10-7	Not evaluated.	EUSES calculation
Annual average mg/m³	1.3x10-7	1.3x10-7	EUSES calculation
Annual deposition mg/m2/d	6.5x10-7	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Wood preservative.

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.241	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.21x10-4	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	0.087	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	6.67x10-5	8.21x10-3	EUSES calculation
Marine water mg/l	8.68x10-5	8.89x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.63	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.284	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.98x10-6	3.77x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.86x10-6	3.79x10-4	EUSES calculation

Groundwater mg/l	Not evaluated.	5.94x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	3.35x10-8	Not evaluated.	EUSES calculation
Annual average mg/m³	3.35x10-8	3.35x10-8	EUSES calculation
Annual deposition mg/m2/d	1.70x10-7	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition UVCB

Product name Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario

Identified use name: Use of preparations containing ethylenamines in open processes with low exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 0.5% - Industrial
Process Category: PROC05, PROC06, PROC08a, PROC08b, PROC09, PROC10, PROC13, PROC16
Substance supplied to that use in form of: In a mixture
Sector of end use: SU03
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC01, ERC04, ERC08a, ERC08b, ERC08d, ERC10b

List of use descriptors

Identified use name: Use of preparations containing ethylenamines in open processes with low exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 0.5% - Industrial
Process Category: PROC05, PROC06, PROC08a, PROC08b, PROC09, PROC10, PROC13, PROC16
Substance supplied to that use in form of: In a mixture
Sector of end use: SU03
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC01, ERC04, ERC08a, ERC08b, ERC08d, ERC10b

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Calendering operations

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 2: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 4: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 5: Roller application or brushing

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.

Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 6: Treatment of articles by dipping and pouring

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 7: Using material as fuel sources, limited exposure to unburned product to be expected

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10: m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. industrial setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Fuel additive.

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.

Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use in detergents and cleaners, including professional

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.185
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Wood preservative.

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	2420
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	484
Average Local Daily Tonnage (kg/day):	1326
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5

Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0.02
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Calendering operations

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 2: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.027	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.76	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.52	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 3: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 4: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 5: Roller application or brushing

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.027	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.76	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.52	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 6: Treatment of articles by dipping and pouring

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 7: Using material as fuel sources, limited exposure to unburned product to be expected

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Fuel additive.

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	5.10x10-6	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	8.37x10-8	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	1.63x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.42x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	1.42x10-9	1.42x10-9	EUSES calculation
Annual deposition mg/m2/d	7.18x10-9	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use in detergents and cleaners, including professional

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	11.5	547	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	4.6x10-4	0.116	EUSES calculation
Soil (direct releases only)	Not evaluated.	5.96	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	4.14	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	3.17x10-3	9.5x10-3	EUSES calculation
Marine water mg/l	4.7x10-3	4.8x10-3	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	1.4	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.39	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not evaluated.	3.38x10-4	EUSES calculation
Grassland averaged mg/kg dwt	Not evaluated.	3.3x10-4	EUSES calculation

Groundwater mg/l	Not evaluated.	9.2x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.3x10-7	Not evaluated.	EUSES calculation
Annual average mg/m³	1.3x10-7	1.3x10-7	EUSES calculation
Annual deposition mg/m2/d	6.5x10-7	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Wood preservative.

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0.241	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.21x10-4	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	0.087	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	6.67x10-5	8.21x10-3	EUSES calculation
Marine water mg/l	8.68x10-5	8.89x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not applicable	2.63	EUSES calculation
Marine water sediment mg/kg dwt	Not applicable	0.284	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.98x10-6	3.77x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.86x10-6	3.79x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.94x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	3.35x10-8	Not evaluated.	EUSES calculation
Annual average mg/m³	3.35x10-8	3.35x10-8	EUSES calculation
Annual deposition mg/m2/d	1.70x10-7	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Professional

Identification of the substance or mixture

Product definition	UVCB
Product name	Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario	**Identified use name:** Use of preparations containing ethylenamines in open processes with low exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 2% - Professional **Process Category:** PROC08a, PROC10 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU03, SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC04, ERC08a, ERC08b, ERC08d, ERC10b
List of use descriptors	**Identified use name:** Use of preparations containing ethylenamines in open processes with low exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 2% - Professional **Process Category:** PROC08a, PROC10 **Substance supplied to that use in form of:** In a mixture **Sector of end use:** SU03, SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC04, ERC08a, ERC08b, ERC08d, ERC10b

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 1: Roller application or brushing

Product Characteristics:	Liquid. Covers concentrations up to 2%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Use the following local exhaust ventilation types: Treat air emission to provide a typical removal efficiency of (%): 90%
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Fuel additive.

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use in detergents and cleaners, including professional

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.185
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Wood preservative.

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	2420
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	484
Average Local Daily Tonnage (kg/day):	1326
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0.02
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.305	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.

Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.61	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 1: Roller application or brushing

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	Not applicable.	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.305	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	0.61	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Fuel additive.

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	5.10x10-6	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.
	Value	**Justification**	

Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	8.37x10-8	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	1.63x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.42x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	1.42x10-9	1.42x10-9	EUSES calculation
Annual deposition mg/m2/d	7.18x10-9	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use in detergents and cleaners, including professional

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	11.5	547	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	4.6x10-4	0.116	EUSES calculation
Soil (direct releases only)	Not evaluated.	5.96	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	4.14	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	3.17x10-3	9.5x10-3	EUSES calculation
Marine water mg/l	4.7x10-3	4.8x10-3	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	1.4	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.39	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not evaluated.	3.38x10-4	EUSES calculation
Grassland averaged mg/kg dwt	Not evaluated.	3.3x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	9.2x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.3x10-7	Not evaluated.	EUSES calculation
Annual average mg/m³	1.3x10-7	1.3x10-7	EUSES calculation
Annual deposition mg/m2/d	6.5x10-7	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Wood preservative.

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0.241	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.21x10-4	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	Not applicable.

	Value	Justification
Concentration in sewage (PECstp) mg/l	0.087	EUSES calculation
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	6.67x10-5	8.21x10-3	EUSES calculation
Marine water mg/l	8.68x10-5	8.89x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.

	Local concentration	PEC sediment (local+regional)	Justification
Fresh water sediment mg/kg dwt	Not evaluated.	2.63	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.284	EUSES calculation

	Local concentration	PEC soil (local+regional)	Justification
Agricultural soil averaged mg/kg dwt	1.98x10-6	3.77x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.86x10-6	3.79x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.94x10-6	EUSES calculation

	Local concentration	PEC air (local+regional)	Justification
During emission mg/m³	3.35x10-8	Not evaluated.	EUSES calculation
Annual average mg/m³	3.35x10-8	3.35x10-8	EUSES calculation
Annual deposition mg/m2/d	1.70x10-7	Not evaluated.	EUSES calculation

	Local concentration	PEC aquatic (local+regional)	Justification
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.

Annex to the extended Safety Data Sheet (eSDS)

Professional

Identification of the substance or mixture

Product definition UVCB

Product name Pentaethylenehexamine, PEHA

Section 1: Title

Short title of the exposure scenario

Identified use name: Use of preparations containing ethylenamines in open processes with low exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 0.5% - Professional
Process Category: PROC08a
Substance supplied to that use in form of: In a mixture
Sector of end use: SU22
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC01, ERC04, ERC08a, ERC08b, ERC08d, ERC10b

List of use descriptors

Identified use name: Use of preparations containing ethylenamines in open processes with low exposure potential and evaporation as most likely exposure form - Use of preparations containing EA up to 0.5% - Professional
Process Category: PROC08a
Substance supplied to that use in form of: In a mixture
Sector of end use: SU22
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC01, ERC04, ERC08a, ERC08b, ERC08d, ERC10b

Section 2: Operational conditions and risk management measures

Section 2.1 Control of worker exposure

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product Characteristics:	Liquid. Covers concentrations up to 0.5%
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently).
Human factors not influenced by risk management:	Default breathing volume Light work 10 m³/d Default Body weight: Workers: 70 kg
Other operational conditions affecting worker exposure:	Indoor. professional setting
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical conditions and measures to control dispersion from source towards the worker:	Not applicable.
Organisational measures to prevent/limit releases, dispersion and exposure:	Not applicable.
Personal protection:	Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of environmental exposure

Contributing exposure scenario controlling environmental exposure for 0: Fuel additive.

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000

Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	No wastewater treatment required.
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 1: Use in detergents and cleaners, including professional

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	1860
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	372
Average Local Daily Tonnage (kg/day):	1019
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	1.00x10-4
Release fraction to wastewater from process (initial release prior to RMM):	0.185
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Contributing exposure scenario controlling environmental exposure for 2: Wood preservative.

Operational conditions: Indoor/Outdoor use.

Product Characteristics:	Not applicable.
Concentration of substance in mixture or article:	
Amounts used:	
Regional use tonnage (tonnes/year):	2420
Fraction of Regional tonnage used locally:	20%
Annual site tonnage (tonnes/year):	484
Average Local Daily Tonnage (kg/day):	1326
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365
Environmental factors not influenced by risk management:	
Local marine water dilution factor:	1000
Other operational conditions of use affecting environmental exposure:	None.
Release fraction to air from process (initial release prior to RMM):	1.00x10-5
Release fraction to soil from process (initial release prior to RMM):	0
Release fraction to wastewater from process (initial release prior to RMM):	0.02
Technical conditions and measures at process level (source) to prevent release:	Not applicable.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Soil emission controls are not applicable as there is no direct release to soil.
Treat air emission to provide a typical removal efficiency of (%):	No air emission controls required; required removal efficiency is 0%.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	=>27.7
Organisational measures to prevent/limit release from site:	
Conditions and measures related to municipal sewage treatment plant:	

Section 3: Exposure estimation

Section 3.1Workers Exposure estimation

Contributing exposure scenario controlling worker exposure for 0: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Not applicable.	0.027	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Inhalable	Not applicable.	0.76	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value
Long term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Dermal	Not applicable.	Not applicable.	Not applicable.
Long term exposure, Local, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Systemic, Inhalable	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.

Short term exposure, Systemic, Combined	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Dermal	Not applicable	Not applicable.	Since the substance is not classified for acute effects and therefore, no acute DNEL has been derived.
Short term exposure, Local, Inhalable	Not applicable.	1.52	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. The PROC with the highest exposure level is given since the exposure estimates for other PROC are below this value

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 0: Fuel additive.

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	0	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	5.10x10-6	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable as there is no release to wastewater.	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	Not applicable as there is no release to wastewater.	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	0	8.15x10-3	EUSES calculation
Marine water mg/l	0	8.02x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.61	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.256	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	8.37x10-8	3.75x10-4	EUSES calculation
Grassland averaged mg/kg dwt	1.63x10-7	3.75x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.91x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.42x10-9	Not evaluated.	EUSES calculation
Annual average mg/m³	1.42x10-9	1.42x10-9	EUSES calculation
Annual deposition mg/m2/d	7.18x10-9	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 1: Use in detergents and cleaners, including professional

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	11.5	547	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	4.6x10-4	0.116	EUSES calculation
Soil (direct releases only)	Not evaluated.	5.96	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	4.14	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	3.17x10-3	9.5x10-3	EUSES calculation

Marine water mg/l	4.7x10-3	4.8x10-3	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	1.4	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.39	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not evaluated.	3.38x10-4	EUSES calculation
Grassland averaged mg/kg dwt	Not evaluated.	3.3x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	9.2x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	1.3x10-7	Not evaluated.	EUSES calculation
Annual average mg/m³	1.3x10-7	1.3x10-7	EUSES calculation
Annual deposition mg/m2/d	6.5x10-7	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 3.2 Environment Exposure estimation

Contributing exposure scenario controlling environmental exposure for 2: Wood preservative.

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	0.241	737	EUSES calculation
Surface water	Not evaluated.	0	EUSES calculation
air (direct + STP)	1.21x10-4	0.231	EUSES calculation
Soil (direct releases only)	Not evaluated.	6.94	EUSES calculation
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	0.087	EUSES calculation	
Concentration in sewage sludge mg/kg dwt	0	EUSES calculation	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	6.67x10-5	8.21x10-3	EUSES calculation
Marine water mg/l	8.68x10-5	8.89x10-4	EUSES calculation
Intermittent release. mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC sediment (local+regional)**	**Justification**
Fresh water sediment mg/kg dwt	Not evaluated.	2.63	EUSES calculation
Marine water sediment mg/kg dwt	Not evaluated.	0.284	EUSES calculation
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	1.98x10-6	3.77x10-4	EUSES calculation
Grassland averaged mg/kg dwt	3.86x10-6	3.79x10-4	EUSES calculation
Groundwater mg/l	Not evaluated.	5.94x10-6	EUSES calculation
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	3.35x10-8	Not evaluated.	EUSES calculation
Annual average mg/m³	3.35x10-8	3.35x10-8	EUSES calculation
Annual deposition mg/m2/d	1.70x10-7	Not evaluated.	EUSES calculation
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	Not applicable.	Not applicable.

Section 4: Guidance to check compliance with the exposure scenario

Environment	Not available.
Health	Not available.

Section 5. Remarks: Additional good practice advice beyond the REACH CSA

Environment	Not applicable.
Health	Not applicable.
Additional good practices	Not applicable.