SAFETY DATA SHEET

N-Aminoethylpiperazine, AEP

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

1.1 Product identifier

Product name : N-Aminoethylpiperazine, AEP

Index number : 612-105-00-4

EC number : 205-411-0

REACH Registration number

Registration number	Legal entity
01-2119471486-30-0003	Delamine BV

CAS number : 140-31-8

Product description : Not applicable

Product type : Liquid.

Other means of identification : Piperazine, 1-(2-aminoethyl)-; 1-Piperazineethanamine; 2-(1-Piperazinyl) ethylamine, >10 - 24% in a non hazardous diluent; 2-(1-Piperazinyl) ethylamine; N-(2-AMINOETHYL)PIPERAZINE; N-(Aminoethyl)piperazine; 1-(2-Aminoethyl) piperazine

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

Product use : Intermediate. Adhesives, binding agents Fixing agents Laboratory activities

Area of application : Industrial applications.

Identified uses
☑ Consumer use as an epoxy and polyurethane curing agent Formulation - Industrial Gas Sweetening - Industrial Manufacture of substance - Industrial Monomer in Polymer / Manufacturing of Polyamides and Copolymers- Industrial Use as an epoxy curing agent - Industrial Use as an epoxy curing agent - Professional

1.3 Details of the supplier of the safety data sheet

DELAMINE B.V.
Barchman Wuytierslaan 10
3818 LH Amersfoort
Netherlands
Telephone number: +31-334676897

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

1.4 Emergency telephone number

Supplier

Telephone number : GBK/Infotrac ID 104075 : International (001) 352 323 3500 (24 hours per day)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Product definition : Mono-constituent substance

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

Acute Tox. 4, H302
Acute Tox. 3, H311
Skin Corr. 1B, H314
Eye Dam. 1, H318
Skin Sens. 1, H317
Aquatic Chronic 3, H412

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

Xn; R21/22
C; R34
R43
R52/53

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

Precautionary statements

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.

Hazardous ingredients : 2-piperazin-1-ylethylamine

Supplemental label elements : Not applicable.

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

Special packaging requirements

Containers to be fitted with child-resistant fastenings : Not applicable.

SECTION 2: Hazards identification

Tactile warning of danger : Not 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 : Mono-constituent substance

Product/ingredient name	Identifiers	%	Classification 67/548/EEC	Classification Regulation (EC) No. 1272/2008 [CLP]	Type
2-piperazin-1-ylethylamine	EC: 205-411-0 CAS: 140-31-8 Index: 612-105-00-4	98 - 100	Xn; R21/22 C; R34 R43 R52/53	Acute Tox. 4, H302 Acute Tox. 3, H311 Skin Corr. 1B, H314 Eye Dam. 1, H318 Skin Sens. 1, H317 Aquatic Chronic 3, H412	[A]
2-(2-aminoethylamino) ethanol	EC: 203-867-5 CAS: 111-41-1 Index: 603-194-00-0	<0.3	Repr. Cat. 2; R61 Repr. Cat. 3; R62 C; R34 R43, R64	Skin Corr. 1B, H314 Eye Dam. 1, H318 Skin Sens. 1B, H317 Repr. 1B, H360FD (Fertility and Unborn child) Lact., H362 STOT SE 3, H335 (Respiratory tract irritation)	[B]
			See Section 16 for the full text of the R-phrases declared above.	**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

[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.

SECTION 4: First aid measures

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. Toxic in contact with skin. May cause an allergic skin reaction.

Ingestion : Harmful if swallowed. Corrosive to the digestive tract. Causes burns. May cause burns to mouth, throat and stomach.

Over-exposure signs/symptoms

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

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

SECTION 4: First aid measures

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 harmful 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 thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides

5.3 Advice for firefighters

Special protective actions 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.

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.

SECTION 6: Accidental release measures

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. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product.

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. 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. 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.

Seveso II Directive - Reporting thresholds (in tonnes)

Danger criteria

Category	Notification and MAPP threshold	Safety report threshold
H2: Acute toxicity 2 any route of entry or Acute toxicity 3 Inhalation/Dermal route of entry	50	200

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.

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 monitoring standards, such as the following: European Standard EN 689 (Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy) European Standard EN 14042 (Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents) European Standard EN 482 (Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents) Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

DNELs/DMELs

Product/ingredient name	Type	Exposure	Value	Population	Effects
2-piperazin-1-ylethylamine	DNEL	Short term Dermal	20 mg/kg bw/day	Workers	Systemic
	DNEL	Short term Inhalation	21.4 mg/m³	Workers	Systemic
	DNEL	Short term Dermal	0.04 mg/cm²	Workers	Local
	DNEL	Long term Dermal	3.3 mg/kg bw/day	Workers	Systemic
	DNEL	Long term Inhalation	3.6 mg/m³	Workers	Systemic
	DNEL	Long term Dermal	0.006 mg/cm²	Workers	Local
	DNEL	Short term Dermal	10 mg/kg bw/day	Consumers	Systemic
	DNEL	Short term Inhalation	5.3 mg/m³	Consumers	Systemic
	DNEL	Short term Oral	1.5 mg/kg bw/day	Consumers	Systemic
	DNEL	Short term Oral	0.02 mg/cm²	Consumers	Local
	DNEL	Long term Dermal	1.7 mg/kg bw/day	Consumers	Systemic
	DNEL	Long term Inhalation	0.9 mg/m³	Consumers	Systemic
	DNEL	Long term Oral	0.3 mg/kg bw/day	Consumers	Systemic
	DNEL	Long term Dermal	0.003 mg/cm²	Consumers	Local
2-(2-aminoethylamino)ethanol	DNEL	Long term Inhalation	3.53 mg/m³	Workers	Systemic
	DNEL	Long term Dermal	8.33 mg/kg bw/day	Workers	Systemic

PNECs

SECTION 8: Exposure controls/personal protection

Product/ingredient name	Compartment Detail	Value	Method Detail
2-piperazin-1-ylethylamine	Fresh water	0.058 mg/l	Assessment Factors
	Marine	0.0058 mg/l	Assessment Factors
	Fresh water sediment	215 mg/kg dwt	-
	Marine water sediment	21.5 mg/kg dwt	-
	Soil	42.9 mg/kg dwt	-
	Sewage Treatment Plant	250 mg/l	Assessment Factors
2-(2-aminoethylamino)ethanol	Fresh water	0.022 mg/l	Assessment Factors
	Marine water	0.0022 mg/l	Assessment Factors
	Fresh water sediment	1.3 mg/kg dwt	-
	Marine water sediment	0.13 mg/kg dwt	-
	Soil	0.246 mg/kg dwt	-
	Sewage Treatment Plant	82.2 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. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

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. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated. > 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

SECTION 8: Exposure controls/personal protection

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 : Colourless.

Odour : Ammonia.

Odour threshold : Not available.

pH : 11.4 [Conc. (% w/w): 1%]

Melting point/freezing point : -19°C

Initial boiling point and boiling range : 220.4°C

Flash point : Closed cup: 99°C

Evaporation rate : Not available.

Flammability (solid, gas) : Not applicable.

Burning time : Not applicable.

Burning rate : Not applicable.

Upper/lower flammability or explosive limits : Lower: 1.1%
Upper: 9.4%

Vapour pressure : 0.0052 kPa [room temperature]

Vapour density : 4.4 [Air = 1]

Relative density : Not available.

Solubility(ies) : Not available.

Solubility in water : Miscible in water.

Partition coefficient: n-octanol/water : -1.48

Auto-ignition temperature : >300°C

Decomposition temperature : Not available.

Viscosity : Dynamic (room temperature): 14.1 mPa·s

Explosive properties : Not applicable.

Oxidising properties : Not applicable

9.2 Other information

Density : 0.98 g/cm³ [20°C]

Physical/chemical properties comments : 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.

Under normal conditions of storage and use, hazardous polymerisation will not occur.

SECTION 10: Stability and reactivity

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
2-piperazin-1-ylethylamine	LD50 Dermal LD50 Oral	Rabbit Rat	866 mg/kg 2140 mg/kg	- -
2-(2-aminoethylamino) ethanol	LD50 Dermal LD50 Oral	Rabbit Rat	>2000 mg/kg 2150 mg/kg	- -

Conclusion/Summary : Dermal Toxic in contact with skin.
Oral Harmful if swallowed.
Inhalation Not applicable.

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
2-piperazin-1-ylethylamine	Eyes - Moderate irritant Skin - Severe irritant	Rabbit Rabbit	- -	24 hours 20 milligrams 24 hours 5 milligrams	- -

Conclusion/Summary

Skin : Corrosive to the skin.

Eyes : Corrosive to eyes.

Respiratory : No additional information.

Sensitisation

Product/ingredient name	Route of exposure	Species	Result
2-piperazin-1-ylethylamine 2-(2-aminoethylamino) ethanol	skin skin	Guinea pig Guinea pig	Sensitising 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
2-piperazin-1-ylethylamine	-	Experiment: In vivo Subject: Mammalian-Animal Cell: Germ	Negative
2-(2-aminoethylamino) ethanol	OECD 471 Bacterial Reverse Mutation Test OECD 476 In vitro Mammalian Cell Gene Mutation Test	Experiment: In vitro Subject: Bacteria Experiment: In vivo Subject: Mammalian-Animal	Negative Negative

SECTION 11: Toxicological information

Conclusion/Summary : No mutagenic effect.

Carcinogenicity

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

Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility	Developmental toxin	Species	Dose	Exposure
2-piperazin-1-ylethylamine	-	Negative	Negative	Rat	Oral	-
2-(2-aminoethylamino) ethanol	-	Positive	Positive	Rat	Oral	-

Conclusion/Summary : Fertility NOAEL = 598mg/kg bw/day
Developmental Toxicity: NOAEL = 899mg/kg bw/day
Not classified.

Teratogenicity

Product/ingredient name	Result	Species	Dose	Exposure
2-(2-aminoethylamino) ethanol	Negative - Oral	Rat	-	-

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

Specific target organ toxicity (single exposure)

Product/ingredient name	Category	Route of exposure	Target organs
2-(2-aminoethylamino)ethanol	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

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. Toxic in contact with skin. May cause an allergic skin reaction.

Ingestion : Harmful if swallowed. Corrosive to the digestive tract. Causes burns. May cause burns to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

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

Inhalation : No specific data.

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

SECTION 11: Toxicological information

Ingestion : Adverse symptoms may include the following:
stomach pains

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
2-piperazin-1-ylethylamine	Sub-chronic NOAEL Oral	Rat	152 mg/kg	-
	Sub-chronic NOAEL Dermal	Rat	1000 mg/kg	-
2-(2-aminoethylamino) ethanol	Sub-acute NOAEL Oral	Rat	250 mg/kg	28 days
	Sub-acute NOAEL Dermal	Rat	1000 mg/kg	28 days

Conclusion/Summary : Cannot be classified.

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

Carcinogenicity : No known significant effects or critical hazards.

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 : Rapidly absorbed.

Metabolism : Slowly metabolised.

Elimination : Rapidly excreted. Excreted via the urine. Excreted via the faeces.

Other information : No specific data.

SECTION 12: Ecological information

12.1 Toxicity

Product/ingredient name	Result	Species	Exposure
2-piperazin-1-ylethylamine	EC50 511 mg/l	Micro-organism	2 hours
	NOEC 250 mg/l	Micro-organism	2 hours
	Acute EC50 1000 mg/l Fresh water	Algae	72 hours
	Acute EC50 58 mg/l Fresh water	Daphnia	48 hours
	Acute LC50 2190 mg/l Fresh water	Fish	96 hours
2-(2-aminoethylamino) ethanol	EC50 >1003 mg/l	Micro-organism	30 minutes
	Acute EC50 353.6 mg/l	Algae	72 hours
	Acute EC50 22 mg/l	Daphnia	48 hours
	Acute LC50 690 mg/l	Fish	96 hours
	Acute NOEC 10 mg/l	Daphnia	48 hours
	Chronic EC10 156 mg/l	Algae	72 hours

Conclusion/Summary : AQUATIC TOXICITY (CHRONIC)
PNEC Intermittent release.= 0.58 mg/l

12.2 Persistence and degradability

SECTION 12: Ecological information

Product/ingredient name	Test	Result	Dose	Inoculum
2-(2-aminoethylamino) ethanol	OECD 301F Ready Biodegradability - Manometric Respirometry Test	>60 % - 28 days	-	-

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

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
2-piperazin-1-ylethylamine 2-(2-aminoethylamino) ethanol	- -	- -	Not readily Readily

12.3 Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
2-piperazin-1-ylethylamine 2-(2-aminoethylamino) ethanol	-1.48 -1.46	- 2.1	low low

12.4 Mobility in soil

Soil/water partition coefficient (K_{OC}) : 37000

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. 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. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction.

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.

SECTION 13: Disposal considerations

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	IMDG	IATA
14.1 UN number	UN2815	UN2815	UN2815	UN2815
14.2 UN proper shipping name	N-AMINOETHYLPIPERAZINE	N-AMINOETHYLPIPERAZINE	N-AMINOETHYLPIPERAZINE	N-Aminoethylpiperazine
14.3 Transport hazard class(es)	8 	8 	8 	8 
14.4 Packing group	III	III	III	III
14.5 Environmental hazards	No.	Yes.	No.	No.
Additional information	**Hazard identification number** 80 **Limited quantity** 5 L **Tunnel code** (E)	The product is only regulated as an environmentally hazardous substance when transported in tank vessels.	**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 Packaging instructions: Y841 **Special provisions** A803

14.6 Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

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.

Product/ingredient name	Carcinogenic effects	Mutagenic effects	Developmental effects	Fertility effects
2-(2-aminoethylamino) ethanol	-	-	Repr. 1B, H360D (Unborn child) Lact., H362	Repr. 1B, H360F (Fertility)

Seveso II Directive

This product is controlled under the Seveso II Directive.

Danger criteria

Category
H2: Acute toxicity 2 any route of entry or Acute toxicity 3 Inhalation/Dermal route of entry

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]
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
EUH statement = CLP-specific Hazard statement
PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
RRN = REACH Registration Number
vPvB = Very Persistent and Very Bioaccumulative

Key literature references and sources for data : Regulation (EC) No. 1272/2008 [CLP]; European convention concerning international road transport of dangerous goods (ADR) done in Geneva on September 30, 1957 (Dz. U. no. 35/1975, pos. 189) plus amendments; Regulation for the transport of dangerous materials on the Rhine (ADN); Occupational exposure limits; International regulations

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

SECTION 16: Other information

Classification	Justification
Acute Tox. 4, H302	Expert judgment
Acute Tox. 3, H311	Expert judgment
Skin Corr. 1B, H314	Expert judgment
Eye Dam. 1, H318	Expert judgment
Skin Sens. 1, H317	Expert judgment
Aquatic Chronic 3, H412	Expert judgment

Full text of abbreviated H statements :

H302	Harmful if swallowed.
H311	Toxic in contact with skin.
H314	Causes severe skin burns and eye damage.
H317	May cause an allergic skin reaction.
H318	Causes serious eye damage.
H335 (Respiratory tract irritation)	May cause respiratory irritation. (Respiratory tract irritation)
H360FD (Fertility and Unborn child)	May damage fertility. May damage the unborn child.
H362	May cause harm to breast-fed children.
H412	Harmful to aquatic life with long lasting effects.

Full text of classifications [CLP/GHS] :

Acute Tox. 3, H311	ACUTE TOXICITY (dermal) - Category 3
Acute Tox. 4, H302	ACUTE TOXICITY (oral) - Category 4
Aquatic Chronic 3, H412	LONG-TERM AQUATIC HAZARD - Category 3
Eye Dam. 1, H318	SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1
Lact., H362	TOXIC TO REPRODUCTION - Effects on or via lactation
Repr. 1B, H360FD (Fertility and Unborn child)	TOXIC TO REPRODUCTION (Fertility and Unborn child) - Category 1B
Skin Corr. 1B, H314	SKIN CORROSION/IRRITATION - Category 1B
Skin Sens. 1, H317	SKIN SENSITIZATION - Category 1
Skin Sens. 1B, H317	SKIN SENSITIZATION - Category 1B
STOT SE 3, H335 (Respiratory tract irritation)	SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3

Full text of abbreviated R phrases :

R61- May cause harm to the unborn child.
R62- Possible risk of impaired fertility.
R21/22- Also harmful in contact with skin and if swallowed.
R34- Causes burns.
R43- May cause sensitisation by skin contact.
R64- May cause harm to breastfed babies.
R52/53- Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Full text of classifications [DSD/DPD] :

Repr. Cat. 2 - Toxic to reproduction category 2
Repr. Cat. 3 - Toxic to reproduction category 3
C - Corrosive
Xn - Harmful

Training advice : Ensure operatives are trained to minimise exposures. Training staff on good practice.

Date of issue/ Date of revision : 15/04/2014

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Version : 9

Notice to reader

SECTION 16: Other information

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	Mono-constituent substance
Product name	N-Aminoethylpiperazine, AEP

Section 1: Title

Short title of the exposure scenario/List of use descriptors	**Identified use name:** Consumer use as an epoxy and polyurethane curing agent **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC08c, ERC08f **Market sector by type of chemical product:** PC01, PC09a, PC09b, PC09c, PC32
Processes and activities covered by the exposure scenario	Covers indoor use of substances (non-processing aids) by the public at large or professional use, which will be physically or chemically bound into or onto a matrix (material) such as binding agent in paints and coatings or adhesives, dyeing of textile fabrics.
Assessment Method	See Section 3

Section 2: Operational conditions and risk management measures

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 0: Wide dispersive indoor use resulting in inclusion into or onto a matrix

Product characteristics:	Not available.
Amounts used:	5000 Tonnes/year
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day)	Not available.
Maximum daily site tonnage (kg/day):	27
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365 - ERC 8c
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	Do not pour down the drain Contain and dispose of waste according to local regulations. Prevent exposure of soil using protective covers
Release fraction to air from process (initial release prior to RMM):	1.50E-01
Release fraction to soil from process (initial release prior to RMM):	0.00E+00
Release fraction to wastewater from process (initial release prior to RMM):	1.00E-02
Conditions and measures related to municipal sewage treatment plant:	Not applicable.
Estimated substance removal from wastewater via on-site sewage treatment (%):	Not available.
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Assumed on-site sewage treatment plant flow (m^3/d):	Not available.
Conditions and measures related to external treatment of waste for disposal:	Not applicable.
Conditions and measures related to external recovery of waste:	Not applicable.
Local release to soil:	0.00E+00

Local release to air:	4.11E-01
Local release to sewage:	2.74E-02
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.002

Contributing scenario controlling environmental exposure for 1: Wide dispersive outdoor use resulting in inclusion into or onto a matrix

Product characteristics:	Not available.
Amounts used:	
Fraction of EU tonnage used in region:	Not available.
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day)	Not available.
Maximum daily site tonnage (kg/day):	Not available.
Frequency and duration of use:	
Emission Days (days/year):	Not available.
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	Not available.
Local marine water dilution factor:	Not available.
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	Not available.
Release fraction to soil from process (initial release prior to RMM):	Not available.
Release fraction to wastewater from process (initial release prior to RMM):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Estimated substance removal from wastewater via on-site sewage treatment (%):	Not available.
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not available.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not available.
Assumed on-site sewage treatment plant flow (m^3/d):	Not available.

Section 2.2: Control of consumer exposure

Contributing scenario controlling consumer exposure for 0: Coatings and paints, thinners, paint removers

Contributing scenarios: Operational conditions and risk management measures

Section 2.2: Control of consumer exposure

Contributing scenario controlling consumer exposure for 1: Adhesives, sealants

Contributing scenarios: Operational conditions and risk management measures

Section 3: Exposure estimation and reference to its source

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 0: Wide dispersive indoor use resulting in inclusion into or onto a matrix

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Regional PEC: 1.186-02	Not applicable.
air (direct + STP)	Not applicable.	Regional PEC: 2.134E-06	Not applicable.
Soil (direct releases only)	Not applicable.	Regional PEC natural soil Total: 7.031E-03; Regional PEC industrial soil Total: 7.031E-03	Not applicable.

Value	Justification

Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Local, During emission / Dissolved : 2.180E-03; Annual average , Local / Dissolved : 2.180E-03 ; Regional PEC[Total]:1.186E-02	Not applicable.
Marine water mg/l	Not applicable.	Local , During emission / Dissolved : 2.200E-04 ; Annual average , Local / Dissolved, 2.200E-04; Regional PEC [Total]: 1.217E-03	Not applicable.
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.	During emission: 8.236E-03; Regional PEC Total: 3.913E-02	Not applicable.
Marine water sediment mg/kg dwt	Not applicable.	During emission: 8.311E-04; Regional PEC Total: 4.079E-03	Not applicable.
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	4.418E-04, 30 days; 4.418E-04, 180 days; Regional PEC [Total]: 5.072E-04	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	4.418E-04, 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	1.862E-12	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	1.400E-02	Not applicable.

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 1: Wide dispersive outdoor use resulting in inclusion into or onto a matrix

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Regional PEC: 1.186-02	Not applicable.
air (direct + STP)	Not applicable.	Regional PEC: 2.134E-06	Not applicable.
Soil (direct releases only)	Not applicable.	Regional PEC natural soil Total: 7.031E-03; Regional PEC industrial soil Total: 7.031E-03	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Local, During emission / Dissolved : 2.180E-03; Annual average , Local / Dissolved : 2.180E-03 ; Regional PEC[Total]:1.186E-02	Not applicable.
Marine water mg/l	Not applicable.	Local , During emission / Dissolved : 2.200E-04 ; Annual average , Local / Dissolved, 2.200E-04; Regional PEC [Total]: 1.217E-03	Not applicable.
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.	During emission: 8.236E-03; Regional PEC Total: 3.913E-02	Not applicable.

Marine water sediment mg/kg dwt	Not applicable.	During emission: 8.311E-04; Regional PEC Total: 4.079E-03	Not applicable.
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	4.418E-04, 30 days; 4.418E-04, 180 days; Regional PEC [Total]: 5.072E-04	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	4.418E-04, 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	1.862E-12	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	1.400E-02	Not applicable.

Section 3:.2 Exposure estimation - Consumers

Exposure estimation and reference to its source - Consumers: 4: Coatings and paints, thinners, paint removers

	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: Coatings and paints, thinners, paint removers	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Inhalation :

Mode of release: Not applicable.

Exposure estimation and reference to its source - Consumers: 2: Coatings and paints, thinners, paint removers

Exposure (minutes):	**Application duration:**	**Amount/concentration applied (g):**	**Room volume (m³):**	**Room volume x ventilation rate: (l/h):**
Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Release area (cm2):	**Temperature (°C):**	**Mass transfer rate:**	**Contributing Scenario Molecular weight (g/mole):**	**Uptake fraction (Update model):**	**Inhalation rate:**
Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Dermal:

Application methods: Not applicable.

Surface area (Skin contact area) cm2:	**Product amount (g):**	**Uptake fraction (Update model):**	**Inhalation event (mg/m³):**
Not applicable.	Not applicable.	Not applicable.	Not applicable.

Inhalation mg/m³ (Concentration on day of exposure):	**Dermal load (mg/cm2):**	**Dermal External dose (mg/kg bw):**	**Dermal (Internal dose) mg/kg bw/day:**
Not applicable.	Not applicable.	Not applicable.	Not applicable.

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:**
Not applicable.	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Exposure estimation - Consumers

Exposure estimation and reference to its source - Consumers: 5: Adhesives, sealants

	Contributing Scenario:	**Frequency (1/Year):**	**Weight fraction of substance in the article::**	**Body weight:**	**Calculation method:**
Exposure estimation and reference to its source - Consumers: 1: Adhesives, sealants	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Inhalation :

Mode of release: Not applicable.

Exposure estimation and reference to its source - Consumers: 8: Adhesives, sealants

Exposure (minutes):	Application duration:	Amount/concentration applied (g):	Room volume (m³):	Room volume x ventilation rate: (l/h):
Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Release area (cm2):	Temperature (°C):	Mass transfer rate:	Contributing Scenario Molecular weight (g/mole):	Uptake fraction (Update model):	Inhalation rate:
Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Dermal:

Application methods: Not applicable.

Surface area (Skin contact area) cm2:	Product amount (g):	Uptake fraction (Update model):	Inhalation event (mg/m³):
Not applicable.	Not applicable.	Not applicable.	Not applicable.

Inhalation mg/m³ (Concentration on day of exposure):	Dermal load (mg/cm2):	Dermal External dose (mg/kg bw):	Dermal (Internal dose) mg/kg bw/day:
Not applicable.	Not applicable.	Not applicable.	Not applicable.

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:
Not applicable.	Not applicable.	Not applicable.	Not applicable.

Section 3:.3 Exposure estimation- Consumers

Contributing scenario controlling consumer exposure for 6: Coatings and paints, thinners, paint removers

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	0.000243	ConsExpo 4.1	Not applicable.
Long term exposure, Systemic, Inhalable	0.00501	ConsExpo 4.1	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 Exposure estimation- Consumers

Contributing scenario controlling consumer exposure for 7: Adhesives, sealants

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	0.269	ConsExpo 4.1	Not applicable.
Long term exposure, Systemic, Inhalable	0.000216	ConsExpo 4.1	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 4:: Guidance to DU to evaluate whether 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.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition	Mono-constituent substance
Product name	N-Aminoethylpiperazine, AEP

Section 1:: Title

Short title of the exposure scenario/List of use descriptors	**Identified use name:** Formulation - 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, SU10 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC02, ERC04, ERC05, ERC06a, ERC06b **Market sector by type of chemical product:** PC01 **Specific Environmental Release Category:** ESVOC 3
Processes and activities covered by the exposure scenario	Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading distribution and associated laboratory activities.

Section 2:: Operational conditions and risk management measures

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 0: Formulation of preparations*

Amounts used:	43,000 Tonnes/year
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	143333
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300 - ESVOC 3
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	1.00E-05
Release fraction to soil from process (initial release prior to RMM):	0.00E-00
Release fraction to wastewater from process (initial release prior to RMM):	1.00E-05
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external treatment of waste for disposal:	Store finished products in closed containers (e.g., bulk tanks, drums, cans) Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	2.87E-04
Local release to sewage, kg/day:	2.87E-04
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.002 - Used ECETOC TRA model (May 2010 release).

Use vapour recovery units when necessary

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 1: Industrial use of processing aids in processes and products, not becoming part of articles

Amounts used:	43,000 Tonnes/year
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	143333
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300 - ESVOC 3
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	1.00E-05
Release fraction to soil from process (initial release prior to RMM):	0.00E-00
Release fraction to wastewater from process (initial release prior to RMM):	1.00E-05
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.

If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external treatment of waste for disposal:	Store finished products in closed containers (e.g., bulk tanks, drums, cans) Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	2.87E-04
Local release to sewage, kg/day:	2.87E-04
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.002 - Used ECETOC TRA model (May 2010 release).

Use vapour recovery units when necessary

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 2: Industrial use resulting in inclusion into or onto a matrix

Amounts used:	43,000 Tonnes/year
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	143333
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300 - ESVOC 3
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	1.00E-05
Release fraction to soil from process (initial release prior to RMM):	0.00E-00
Release fraction to wastewater from process (initial release prior to RMM):	1.00E-05
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	

Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external treatment of waste for disposal:	Store finished products in closed containers (e.g., bulk tanks, drums, cans) Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	2.87E-04
Local release to sewage, kg/day:	2.87E-04
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.002 - Used ECETOC TRA model (May 2010 release).

Use vapour recovery units when necessary

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 3: Industrial use resulting in manufacture of another substance (use of intermediates)

Amounts used:	43,000 Tonnes/year
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	143333
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300 - ESVOC 3
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	1.00E-05
Release fraction to soil from process (initial release prior to RMM):	0.00E-00
Release fraction to wastewater from process (initial release prior to RMM):	1.00E-05
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.

Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external treatment of waste for disposal:	Store finished products in closed containers (e.g., bulk tanks, drums, cans) Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	2.87E-04
Local release to sewage, kg/day:	2.87E-04
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.002 - Used ECETOC TRA model (May 2010 release).

Use vapour recovery units when necessary

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 4: Industrial use of reactive processing aids

Amounts used:	43,000 Tonnes/year
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	143333
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300 - ESVOC 3
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	1.00E-05
Release fraction to soil from process (initial release prior to RMM):	0.00E-00
Release fraction to wastewater from process (initial release prior to RMM):	1.00E-05
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.

Conditions and measures related to external treatment of waste for disposal:	Store finished products in closed containers (e.g., bulk tanks, drums, cans) Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	2.87E-04
Local release to sewage, kg/day:	2.87E-04
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.002 - Used ECETOC TRA model (May 2010 release).

Use vapour recovery units when necessary

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

General exposures (closed systems): None.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

General exposures Process sampling: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Mixing operations (closed systems): Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Material transfers: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Wear a respirator conforming to EN140 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Equipment maintenance: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Mixing operations (open systems): Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Equipment maintenance: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Wear a respirator conforming to EN140 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Disposal of waste: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

Contributing 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:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Mixing operations (open systems): Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Equipment maintenance: Provide extract ventilation to points where emissions occur. Avoid carrying out operation for more than 4 hours. Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training.

Mixing operations (closed systems): Provide extract ventilation to points where emissions occur. Avoid carrying out operation for more than 4 hours. Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Drum and small package filling: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Material transfers: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Wear a respirator conforming to EN140 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Laboratory activities: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 3:: Exposure estimation

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 0: Formulation of preparations*

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Surface water, Dissolved During emission Resulting PEC local, water (mg/l): 1.686E-05; Surface water, Dissolved Annual average : 1.431E-05	Not applicable.
Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 1.688E-06; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.433E-06	Not applicable.
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.	6.369E-05	During emission
Marine water sediment mg/kg dwt	Not applicable.	6.377E-06	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	3.143E-07; 30, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	3.143E-07; 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	6.668E-14	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	1.433E-04	Not applicable.

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 1: Industrial use of processing aids in processes and products, not becoming part of articles

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**

Fresh water mg/l	Not applicable.	Surface water, Dissolved During emission Resulting PEC local, water (mg/l): 1.686E-05; Surface water, Dissolved Annual average : 1.431E-05	Not applicable.
Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 1.688E-06; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.433E-06	Not applicable.
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.	6.369E-05	During emission
Marine water sediment mg/kg dwt	Not applicable.	6.377E-06	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	3.143E-07; 30, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	3.143E-07; 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	6.668E-14	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	1.433E-04	Not applicable.

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 2: Industrial use resulting in inclusion into or onto a matrix

	Release from point source (local exposure estimation) kg/ day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Surface water, Dissolved During emission Resulting PEC local, water (mg/l): 1.686E-05; Surface water, Dissolved Annual average : 1.431E-05	Not applicable.
Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 1.688E-06; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.433E-06	Not applicable.
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.	6.369E-05	During emission
Marine water sediment mg/kg dwt	Not applicable.	6.377E-06	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	3.143E-07; 30, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	3.143E-07; 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	6.668E-14	Not applicable.

Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	1.433E-04	Not applicable.

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 3: Industrial use resulting in manufacture of another substance (use of intermediates)

	Release from point source (local exposure estimation) kg/ day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Surface water, Dissolved During emission Resulting PEC local, water (mg/l): 1.686E-05; Surface water, Dissolved Annual average : 1.431E-05	Not applicable.
Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 1.688E-06; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.433E-06	Not applicable.
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.	6.369E-05	During emission
Marine water sediment mg/kg dwt	Not applicable.	6.377E-06	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	3.143E-07; 30, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	3.143E-07; 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	6.668E-14	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	1.433E-04	Not applicable.

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 4: Industrial use of reactive processing aids

	Release from point source (local exposure estimation) kg/ day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**

Fresh water mg/l	Not applicable.	Surface water, Dissolved During emission Resulting PEC local, water (mg/l): 1.686E-05; Surface water, Dissolved Annual average : 1.431E-05	Not applicable.
Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 1.688E-06; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.433E-06	Not applicable.
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.	6.369E-05	During emission
Marine water sediment mg/kg dwt	Not applicable.	6.377E-06	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	3.143E-07; 30, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	3.143E-07; 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	6.668E-14	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	1.433E-04	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	General exposures (closed systems)	0.34	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	General exposures (closed systems)	0.05	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	General exposures (closed systems)	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	General exposures (closed systems)	0.18	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	General exposures (closed systems)	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	General exposures Process sampling	0.14	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	General exposures Process sampling	0.54	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.

Short term exposure, Systemic, Dermal	General exposures Process sampling	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	General exposures Process sampling	1.79	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	General exposures Process sampling	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	Mixing operations (closed systems); Material transfers; Equipment cleaning and maintenance	0.03	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Mixing operations (closed systems); Material transfers; Equipment cleaning and maintenance	1.13, 1.62	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Material transfers , Equipment maintenance	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Material transfers , Equipment maintenance	2.26, 3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Material transfers , Equipment maintenance	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	Mixing operations (open systems); Equipment maintenance; Disposal of waste	0.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Mixing operations (open systems); Equipment maintenance; Disposal of waste	2.69; 1.88; 2.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Mixing operations (open systems); Equipment maintenance; Disposal of waste	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Mixing operations (open systems); Equipment maintenance; Disposal of waste	8.97; 3.77; 5.38	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Mixing operations (open systems); Equipment maintenance; Disposal of waste	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	Mixing operations (open systems)	0.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Mixing operations (open systems)	2.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Mixing operations (open systems)	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Mixing operations (open systems)	8.97	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Mixing operations (open systems)	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	Mixing operations (closed systems), Equipment maintenance	0.41	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Mixing operations (closed systems), Equipment maintenance	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Mixing operations (closed systems), Equipment maintenance	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Mixing operations (closed systems), Equipment maintenance	10.77	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Mixing operations (closed systems), Equipment maintenance	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	Drum and small package filling	0.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Drum and small package filling	0.81	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Drum and small package filling	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Drum and small package filling	1.62	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Drum and small package filling	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	Material transfers	0.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Material transfers	1.88	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Material transfers	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Material transfers	3.77	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Material transfers	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

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

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Laboratory activities	0.03	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Laboratory activities	2.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Laboratory activities	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Laboratory activities	5.38	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Laboratory activities	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	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	Mono-constituent substance
Product name	N-Aminoethylpiperazine, AEP

Section 1:: Title

Short title of the exposure scenario/List of use descriptors	**Identified use name:** Gas Sweetening - Industrial **Process Category:** PROC01, PROC02, PROC03, PROC08a, PROC08b, PROC22 **Substance supplied to that use in form of:** As such **Sector of end use:** SU03, SU08, SU09 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01, ERC04, ERC07 **Market sector by type of chemical product:** PC20 **Specific Environmental Release Category:** ESVOC 31
Processes and activities covered by the exposure scenario	Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in industrial equipment including maintenance and related material transfers.

Section 2:: Operational conditions and risk management measures

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 0: Manufacture of substances

Amounts used:	1000 Tonnes/year
Fraction of EU tonnage used in region:	1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	2150000
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	20 - ESVOC 31
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	1.00E-04
Release fraction to soil from process (initial release prior to RMM):	1.00E-03
Release fraction to wastewater from process (initial release prior to RMM):	1.00E-03
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ³ (%):	Not available.

If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	2.50E-01
Local release to sewage, kg/day:	5.00E-01
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.01 - Used ECETOC TRA model (May 2010 release).

Use vapour recovery units when necessary

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 1: Industrial use of processing aids in processes and products, not becoming part of articles

Amounts used:	1000 Tonnes/year
Fraction of EU tonnage used in region:	1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	2150000
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	20 - ESVOC 31
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	1.00E-04
Release fraction to soil from process (initial release prior to RMM):	1.00E-03
Release fraction to wastewater from process (initial release prior to RMM):	1.00E-03
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.

Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	2.50E-01
Local release to sewage, kg/day:	5.00E-01
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.01 - Used ECETOC TRA model (May 2010 release).

Use vapour recovery units when necessary

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 2: Industrial use of substances in closed systems

Amounts used:	1000 Tonnes/year
Fraction of EU tonnage used in region:	1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	2150000
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	20 - ESVOC 31
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	1.00E-04
Release fraction to soil from process (initial release prior to RMM):	1.00E-03
Release fraction to wastewater from process (initial release prior to RMM):	1.00E-03
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	2.50E-01
Local release to sewage, kg/day:	5.00E-01

Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.01 - Used ECETOC TRA model (May 2010 release).

Use vapour recovery units when necessary

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Material transfers: Avoid carrying out operation for more than 4 hours. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Automated process with (semi) closed systems: Provide extract ventilation to points where emissions occur. Limit the substance content in the product to 1%. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Equipment maintenance: Avoid carrying out operation for more than 4 hours. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Process sampling: Avoid carrying out operation for more than 4 hours. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Material transfers: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Drum/batch transfers: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Material transfers: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Avoid carrying out operation for more than 4 hours. Wear a respirator conforming to EN140 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Drum/batch transfers: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Wear a respirator conforming to EN140 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Material transfers: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Disposal of waste: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

Contributing scenario controlling worker exposure for 5: Potentially closed processing operations with minerals/metals at elevated temperature

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Section 3:: Exposure estimation

Section 3:.1 Environment - Exposure estimation

Contributing 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	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Surface water, Dissolved, During emission Resulting PEC local, water (mg/l): 2.505E-02 ; Surface water, Dissolved, Annual average: 1.422E-03	Not applicable.
Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 2.505E-03; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.422E-04	Not applicable.
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.	9.462E-02	During emission
Marine water sediment mg/kg dwt	Not applicable.	9.462E-03	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	5.564E-06, 30 days; 5.564E-06, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	5.564E-06, 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	3.823E-12	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	0.250	Not applicable.

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 1: Industrial use of processing aids in processes and products, not becoming part of articles

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Surface water, Dissolved, During emission Resulting PEC local, water (mg/l): 2.505E-02 ; Surface water, Dissolved, Annual average: 1.422E-03	Not applicable.

Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 2.505E-03; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.422E-04	Not applicable.
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.	9.462E-02	During emission
Marine water sediment mg/kg dwt	Not applicable.	9.462E-03	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	5.564E-06, 30 days; 5.564E-06, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	5.564E-06, 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	3.823E-12	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	0.250	Not applicable.

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 2: Industrial use of substances in closed systems

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Surface water, Dissolved, During emission Resulting PEC local, water (mg/l): 2.505E-02 ; Surface water, Dissolved, Annual average: 1.422E-03	Not applicable.
Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 2.505E-03; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.422E-04	Not applicable.
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.	9.462E-02	During emission
Marine water sediment mg/kg dwt	Not applicable.	9.462E-03	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	5.564E-06, 30 days; 5.564E-06, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	5.564E-06, 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	3.823E-12	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	0.250	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	General exposures (closed systems)	0.34	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	General exposures (closed systems)	0.05	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	General exposures (closed systems)	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	General exposures (closed systems)	0.18	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	General exposures (closed systems)	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	Material transfers ; Automated process with (semi) closed systems ; Equipment maintenance ; Process sampling	0.08; 0.14; 0.08; 0.08	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Material transfers ; Automated process with (semi) closed systems ; Equipment maintenance ; Process sampling	3.23; 1.35; 3.23; 3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Material transfers ; Automated process with (semi) closed systems ; Equipment maintenance ; Process sampling	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Material transfers ; Automated process with (semi) closed systems ; Equipment maintenance ; Process sampling	10.77; 2.69; 10.77; 10.77	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Material transfers ; Automated process with (semi) closed systems ; Equipment maintenance ; Process sampling	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	Material transfers; Drum/batch transfers	0.03	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Material transfers; Drum/batch transfers	1.62	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Material transfers; Drum/batch transfers	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Material transfers; Drum/batch transfers	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Material transfers; Drum/batch transfers	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	Material transfers	0.82	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Material transfers	2.26	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Material transfers	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Material transfers	7.54	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Material transfers	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	Drum/batch transfers; Material transfers; Disposal of waste	0.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Drum/batch transfers; Material transfers; Disposal of waste	1.88; 2.69; 2.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Drum/batch transfers; Material transfers; Disposal of waste	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Drum/batch transfers; Material transfers; Disposal of waste	3.77; 5.38; 5.38	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Drum/batch transfers; Material transfers; Disposal of waste	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 5: Potentially closed processing operations with minerals/metals at elevated temperature

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.
Short term exposure, Systemic, Dermal	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Systemic, Inhalable	Not applicable.	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.

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	Mono-constituent substance
Product name	N-Aminoethylpiperazine, AEP

Section 1:: Title

Short title of the exposure scenario/List of use descriptors	**Identified use name:** Manufacture of substance - Industrial **Process Category:** PROC01, PROC02, PROC03, PROC04, PROC08a, PROC15, PROC08b **Substance supplied to that use in form of:** As such **Sector of end use:** SU02a, SU02b, SU03, SU15, SU16 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01 **Specific Environmental Release Category:** ESVOC 1
Processes and activities covered by the exposure scenario	Manufacture of the substance or use as a process chemical or extraction agent. Includes recycling/recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities.

Section 2:: Operational conditions and risk management measures

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 0: Manufacture of substances

Amounts used:	
Fraction of EU tonnage used in region:	1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	Not available.
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300 - ESVOC 1
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	4800 Measured
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	Local release to air: 2.17E-02 Local release to waste water :2.17E+01
Release fraction to air from process (initial release prior to RMM):	1.00E-05
Release fraction to soil from process (initial release prior to RMM):	1.00E-02
Release fraction to wastewater from process (initial release prior to RMM):	1.00E-04
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical conditions and measures at process level (source) to prevent release:	Anaerobic biological treatment - For soluble biodegradable contaminants Aerobic biological treatment - For soluble biodegradable contaminants
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external treatment of waste for disposal:	Store finished products in closed containers (e.g., bulk tanks, drums, cans) Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	2.17E-02
Local release to sewage, kg/day:	2.17E+01
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	1

Use vapour recovery units when necessary

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

General exposures (closed systems): None.

Storage: None.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

General exposures Process sampling: Avoid carrying out operation for more than 4 hours. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

General exposures (closed systems): Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Wear a respirator conforming to EN140 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Material transfers: Wear a respirator conforming to EN140 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Equipment maintenance: Avoid carrying out operation for more than 4 hours. Wear a respirator conforming to EN140 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training.

Section 2.2: Control of worker exposure

Contributing scenario controlling worker exposure for 5: Use as laboratory reagent

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Laboratory activities: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 3:: Exposure estimation

Section 3:.1 Environment - Exposure estimation

Contributing 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	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Surface water, Dissolved, During emission Resulting PEC local, water (mg/l): 9.711E-06 ; Surface water, Dissolved, Annual average: 8.879E-06	Not applicable.
Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 2.234E-04 ; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.837E-04	Not applicable.
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.	3.669E-05	During emission
Marine water sediment mg/kg dwt	Not applicable.	8.440E-04	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	2.690E-06, 30 days; 2.690E-06, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	2.690E-06, 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	4.951E-9	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	2.229E-02	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	General exposures (closed systems); Storage	0.34	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	General exposures (closed systems); Storage	0.05	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	General exposures (closed systems); Storage	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	General exposures (closed systems); Storage	0.11	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	General exposures (closed systems); Storage	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	General exposures Process sampling	0.08	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	General exposures Process sampling	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	General exposures Process sampling	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	General exposures Process sampling	10.77	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	General exposures Process sampling	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	General exposures (closed systems)	0.02	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	General exposures (closed systems)	1.13	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	General exposures (closed systems)	Not applicable	Not applicable.

Short term exposure, Systemic, Inhalable	General exposures (closed systems)	2.26	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	General exposures (closed systems)	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	Material transfers	0.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Material transfers	2.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Material transfers	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Material transfers	5.38	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Material transfers	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 4: 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	Equipment maintenance	0.41	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Equipment maintenance	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Equipment maintenance	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Equipment maintenance	10.77	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Equipment maintenance	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 5: Use as laboratory reagent

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Laboratory activities	0.03	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Laboratory activities	2.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

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.
Short term exposure, Systemic, Dermal	Laboratory activities	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Laboratory activities	8.97	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Laboratory activities	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	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	Mono-constituent substance
Product name	N-Aminoethylpiperazine, AEP

Section 1:: Title

Short title of the exposure scenario/List of use descriptors	**Identified use name:** Monomer in Polymer / Manufacturing of Polyamides and Copolymers- Industrial **Process Category:** PROC02, PROC03 **Substance supplied to that use in form of:** As such **Sector of end use:** SU11, SU12 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC06a **Market sector by type of chemical product:** PC01, PC32 **Specific Environmental Release Category:** ESVOC 44
Processes and activities covered by the exposure scenario	Processing of formulated polymers including material transfers, additives handling (e.g. pigments, stabilisers, fillers, plasticisers, etc.), moulding, curing and forming activities, material re-works, storage and associated maintenance.

Section 2:: Operational conditions and risk management measures

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 0: Industrial use resulting in manufacture of another substance (use of intermediates)

Amounts used:	43,000 Tonnes/year
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	143333
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	300 - ESVOC 44
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	2.00E-02
Release fraction to soil from process (initial release prior to RMM):	0.00E+00
Release fraction to wastewater from process (initial release prior to RMM):	0.00E+00
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external treatment of waste for disposal:	Store finished products in closed containers (e.g., bulk tanks, drums, cans) Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	2.87E+02
Local release to sewage, kg/day:	0.00E+00
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	1

Use vapour recovery units when necessary

Section 2.2: Control of worker exposure

Contributing scenario controlling worker exposure for 0: Use in closed, continuous process with occasional controlled exposure

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

General exposures Disposal of waste: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

Contributing scenario controlling worker exposure for 1: Use in closed batch process (synthesis or formulation)

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Disposal of waste: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 3:: Exposure estimation

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 0: Industrial use resulting in manufacture of another substance (use of intermediates)

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Surface water, Dissolved, During emission Resulting PEC local, water (mg/l): 7.313E-04 ; Surface water, Dissolved, Annual average: 7.313E-04	Not applicable.
Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 7.530E-05; Annual average, Dissolved, Resulting PEC local, water (mg/l): 7.530E-05	Not applicable.
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.	2.763E-03	During emission
Marine water sediment mg/kg dwt	Not applicable.	2.845E-04	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	3.498E-02, 30 days; 3.498E-02, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	3.498E-02, 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	6.550E-08	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	0.000E+00	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 0: Use in closed, continuous process with occasional controlled exposure

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	General exposures Disposal of waste	0.14	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	General exposures Disposal of waste	3.77	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	General exposures Disposal of waste	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	General exposures Disposal of waste	7.54	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	General exposures Disposal of waste	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 1: Use in closed batch process (synthesis or formulation)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Disposal of waste	0.03	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Disposal of waste	1.62	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Disposal of waste	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Disposal of waste	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Disposal of waste	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	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	Mono-constituent substance
Product name	N-Aminoethylpiperazine, AEP

Section 1:: Title

Short title of the exposure scenario/List of use descriptors	**Identified use name:** Use as an epoxy curing agent - Industrial **Process Category:** PROC03, PROC04, PROC05, PROC07, PROC08a, PROC09, PROC10 **Substance supplied to that use in form of:** As such, In a mixture **Sector of end use:** SU17, SU19 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC05 **Market sector by type of chemical product:** PC19 **Article category related to subsequent service life:** Not applicable. **Specific Environmental Release Category:** FEICA 6
Processes and activities covered by the exposure scenario	Covers industrial use of substances other than solvents in paper, board and related products (woodworking and joinery) footwear and leather, textile, others adhesives

Section 2:: Operational conditions and risk management measures

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 0: Industrial use resulting in inclusion into or onto a matrix

Amounts used:	43,000 Tonnes/year
Fraction of EU tonnage used in region:	1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	98
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	220 - FEICA 6
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	9.00E-03
Release fraction to soil from process (initial release prior to RMM):	0.00E+00
Release fraction to wastewater from process (initial release prior to RMM):	0.00E+00
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.

Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external treatment of waste for disposal:	Store finished products in closed containers (e.g., bulk tanks, drums, cans) Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	9.00E-01
Local release to sewage, kg/day:	0.00E+00
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.0005 - Used ECETOC TRA model (May 2010 release).

Use vapour recovery units when necessary

Section 2.2: Control of worker exposure

Contributing scenario controlling worker exposure for 0: Use in closed batch process (synthesis or formulation)

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

General exposures Process sampling: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

Contributing scenario controlling worker exposure for 1: Use in batch and other process (synthesis) where opportunity for exposure arises

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Disposal of waste: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

Contributing scenario controlling worker exposure for 2: Mixing or blending in batch processes for formulation of preparations* and articles (multistage and/or significant contact)

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Mixing operations (closed systems): Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training.

Section 2.2: Control of worker exposure

Contributing scenario controlling worker exposure for 3: Industrial spraying

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Spraying: Provide extract ventilation to points where emissions occur. Avoid carrying out activities involving exposure for more than 4 hours. Wear a full-face respirator conforming to EN136 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Material transfers: Provide extract ventilation to points where emissions occur. Avoid carrying out operation for more than 4 hours. Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Drum and small package filling: Provide extract ventilation to points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Roller, spreader, flow application: Provide extract ventilation to points where emissions occur. Avoid carrying out operation for more than 4 hours. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 3:: Exposure estimation

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 0: Industrial use resulting in inclusion into or onto a matrix

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

	Value	Justification
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	Not applicable.	Surface water, Dissolved, During emission Resulting PEC local, water (mg/l): 3.288E-03; Surface water, Dissolved, Annual average: 3.288E-03	Not applicable.

Marine water mg/l	Not applicable.	Not applicable.	During emission Resulting PEC local, water (mg/l): 3.386E-04; Annual average, Dissolved, Resulting PEC local, water (mg/l): 3.386E-04
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.	1.242E-02	During emission
Marine water sediment mg/kg dwt	Not applicable.	1.279e-03	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	2.762E-03, 30 days; 2.561E-03, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	2.403E-03, 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	1.604E-10	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	0.000E+00	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 0: Use in closed batch process (synthesis or formulation)

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Roller, spreader, flow application	0.03	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Roller, spreader, flow application	1.62	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Roller, spreader, flow application	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Roller, spreader, flow application	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Not applicable.	Roller, spreader, flow application	Not applicable
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 1: 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	Disposal of waste	0.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Disposal of waste	2.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Disposal of waste	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Disposal of waste	5.38	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
	Not applicable.	Not applicable.	Not applicable.

Short term exposure, Systemic, Combined			
Short term exposure, Local, Dermal	Not applicable.	Disposal of waste	Not applicable
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 2: 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	Mixing operations (closed systems)	0.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Mixing operations (closed systems)	2.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Mixing operations (closed systems)	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Mixing operations (closed systems)	5.38	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Not applicable.	Mixing operations (closed systems)	Not applicable
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 3: Industrial spraying

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Spraying	0.51	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Spraying	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Spraying	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Spraying	10.77	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Not applicable.	Spraying	Not applicable
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 4: 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	Material transfers	0.41	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Material transfers	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

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.
Short term exposure, Systemic, Dermal	Material transfers	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Material transfers	10.77	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Not applicable.	Material transfers	Not applicable
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing 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	Drum and small package filling	0.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Drum and small package filling	2.69	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Drum and small package filling	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Drum and small package filling	5.38	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Not applicable.	Drum and small package filling	Not applicable
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

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

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Roller, spreader, flow application	0.33	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Roller, spreader, flow application	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Roller, spreader, flow application	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Roller, spreader, flow application	10.77	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Not applicable.	Roller, spreader, flow application	Not applicable
Short term exposure, Local, Inhalable	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	Mono-constituent substance
Product name	N-Aminoethylpiperazine, AEP

Section 1:: Title

Short title of the exposure scenario/List of use descriptors	**Identified use name:** Use as an epoxy curing agent - Professional **Process Category:** PROC04, PROC10, PROC11, PROC12, PROC19 **Substance supplied to that use in form of:** As such, In a mixture **Sector of end use:** SU22 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC06c, ERC08b, ERC08c, ERC08f **Market sector by type of chemical product:** PC09a, PC09b, PC09c **Specific Environmental Release Category:** FEICA 11
Processes and activities covered by the exposure scenario	Covers wide dispersive use of substances other than solvents in professional and DIY adhesives.

Section 2:: Operational conditions and risk management measures

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 0: Industrial use of monomers for manufacture of thermoplastics

Amounts used:	43,000 Tonnes/year
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	236
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365 - FEICA 11
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	0.00E+00
Release fraction to soil from process (initial release prior to RMM):	0.00E+00
Release fraction to wastewater from process (initial release prior to RMM):	9.00E-03
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.

If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external treatment of waste for disposal:	Not applicable.
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	0.00E+00
Local release to sewage, kg/day:	2.36E-01
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.002 - FEICA 11

Not applicable

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 1: Wide dispersive indoor use of reactive substances in open systems

Amounts used:	43,000 Tonnes/year
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	236
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365 - FEICA 11
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	0.00E+00
Release fraction to soil from process (initial release prior to RMM):	0.00E+00
Release fraction to wastewater from process (initial release prior to RMM):	9.00E-03
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.

Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external treatment of waste for disposal:	Not applicable.
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	0.00E+00
Local release to sewage, kg/day:	2.36E-01
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.002 - FEICA 11

Not applicable

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 2: Wide dispersive indoor use resulting in inclusion into or onto a matrix

Amounts used:	43,000 Tonnes/year
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	236
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365 - FEICA 11
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	0.00E+00
Release fraction to soil from process (initial release prior to RMM):	0.00E+00
Release fraction to wastewater from process (initial release prior to RMM):	9.00E-03
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external treatment of waste for disposal:	Not applicable.
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00

Local release to air, kg/day:	0.00E+00
Local release to sewage, kg/day:	2.36E-01
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.002 - FEICA 11

Not applicable

Section 2.1: Control of environmental exposure

Contributing scenario controlling environmental exposure for 3: Wide dispersive outdoor use resulting in inclusion into or onto a matrix

Amounts used:	43,000 Tonnes/year
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	Not available.
Fraction of Regional tonnage used locally:	Not available.
Annual site tonnage (tonnes/year):	Not available.
Average Local Daily Tonnage (kg/day):	Not available.
Maximum daily site tonnage (kg/day):	236
Frequency and duration of use:	Continuous release.
Emission Days (days/year):	365 - FEICA 11
Environment factors not influenced by risk management:	
Local freshwater dilution factor:	10 Default
Local marine water dilution factor:	100 Default
Other given operational conditions affecting environmental exposure:	
Release fraction to air from process (initial release prior to RMM):	0.00E+00
Release fraction to soil from process (initial release prior to RMM):	0.00E+00
Release fraction to wastewater from process (initial release prior to RMM):	9.00E-03
Release fraction to air from wide dispersive use (regional only):	Not available.
Release fraction to soil from wide dispersive use (regional only):	Not available.
Release fraction to wastewater from wide dispersive use:	Not available.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil:	All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. Soil emission controls are not applicable as there is no direct release to soil. Do not apply industrial sludge to natural soils.
Treat air emission to provide a typical removal efficiency of (%):	Not applicable.
Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of [3] (%):	Not available.
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of [3] (%):	Not available.
Conditions and measures related to municipal sewage treatment plant:	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%):	Not evaluated.
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d):	Not evaluated.
Conditions and measures related to external treatment of waste for disposal:	Not applicable.
Conditions and measures related to external recovery of waste:	Do not apply industrial sludge to natural soils. sludge should be incinerated, contained or reclaimed.
Local release to soil, kg/day:	0.00E+00
Local release to air, kg/day:	0.00E+00
Local release to sewage, kg/day:	2.36E-01
Fraction of substance in end-use products:	1
Total efficiency of removal from air emissions:	Not evaluated.
Fraction of main source to local environment:	0.002 - FEICA 11

Not applicable

Section 2.2: Control of worker exposure

Contributing scenario controlling worker exposure for 0: Use in batch and other process (synthesis) where opportunity for exposure arises

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Cooling cured articles: Limit the substance content in the product to 25%. Wear a respirator conforming to EN140 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training.

Section 2.2: Control of worker exposure

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

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Roller, spreader, flow application: Provide extract ventilation to points where emissions occur. Limit the substance content in the product to 25%. Wear a respirator conforming to EN140 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training.

Section 2.2: Control of worker exposure

Contributing scenario controlling worker exposure for 2: Non industrial spraying

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Spraying: Provide extract ventilation to points where emissions occur. Limit the substance content in the product to 25%. Avoid carrying out operation for more than 4 hours. Wear a full-face respirator conforming to EN136 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 2.2: Control of worker exposure

Contributing scenario controlling worker exposure for 3: Use of blowing agents in manufacture of foam

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Spraying: Limit the substance content in the product to 25%. Wear a respirator conforming to EN140 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training.

Section 2.2: Control of worker exposure

Contributing scenario controlling worker exposure for 4: Hand-mixing with intimate contact and only PPE available

Product characteristics:	Volatility: low
Concentration of substance in product:	Covers percentage substance in the product up to 100%
Physical state:	Liquid.
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:	None identified.
Other given operational conditions affecting workers exposure:	None identified.

Contributing scenarios: Operational conditions and risk management measures

Mixing operations (open systems): Provide extract ventilation to points where emissions occur. Limit the substance content in the product to 25%. Avoid carrying out operation for more than 4 hours. Wear a respirator conforming to EN140 with Type A filter or better. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Section 3:: Exposure estimation

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 0: Industrial use of monomers for manufacture of thermoplastics

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

	Value	Justification
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.

	Local concentration	PEC aquatic (local+regional)	Justification
Fresh water mg/l	Not applicable.	Surface water, Dissolved, During emission Resulting PEC local, water (mg/l): 1.875E-02; Surface water, Dissolved, Annual average: 1.875E-02	Not applicable.

Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 1.892E-03; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.892E-03	Not applicable.
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.	7.083-02	During emission
Marine water sediment mg/kg dwt	Not applicable.	7.148E-03	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	3.895E-03, 30 days;3.848E-03, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	3.810E-03, 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	1.601E-11	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	1.180E-01	Not applicable.

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 1: Wide dispersive indoor use of reactive substances in open systems

	Release from point source (local exposure estimation) kg/day	**Total release for regional exposure estimation kg/day**	**Justification**
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Surface water, Dissolved, During emission Resulting PEC local, water (mg/l): 1.875E-02; Surface water, Dissolved, Annual average: 1.875E-02	Not applicable.
Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 1.892E-03; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.892E-03	Not applicable.
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.	7.083-02	During emission
Marine water sediment mg/kg dwt	Not applicable.	7.148E-03	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	3.895E-03, 30 days;3.848E-03, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	3.810E-03, 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	1.601E-11	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	1.180E-01	Not applicable.

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 2: Wide dispersive indoor use resulting in inclusion into or onto a matrix

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Surface water, Dissolved, During emission Resulting PEC local, water (mg/l): 1.875E-02; Surface water, Dissolved, Annual average: 1.875E-02	Not applicable.
Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 1.892E-03; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.892E-03	Not applicable.
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.	7.083-02	During emission
Marine water sediment mg/kg dwt	Not applicable.	7.148E-03	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	3.895E-03, 30 days;3.848E-03, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	3.810E-03, 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	1.601E-11	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	1.180E-01	Not applicable.

Section 3:.1 Environment - Exposure estimation

Contributing scenario controlling environmental exposure for 3: Wide dispersive outdoor use resulting in inclusion into or onto a matrix

	Release from point source (local exposure estimation) kg/day	Total release for regional exposure estimation kg/day	Justification
Waste water	Not applicable.	Not applicable.	Not applicable.
Surface water	Not applicable.	Not applicable.	Not applicable.
air (direct + STP)	Not applicable.	Not applicable.	Not applicable.
Soil (direct releases only)	Not applicable.	Not applicable.	Not applicable.
	Value	**Justification**	
Concentration in sewage (PECstp) mg/l	Not applicable.	Not applicable.	
Concentration in sewage sludge mg/kg dwt	Not applicable.	Not applicable.	
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Fresh water mg/l	Not applicable.	Surface water, Dissolved, During emission Resulting PEC local, water (mg/l): 1.875E-02; Surface water, Dissolved, Annual average: 1.875E-02	Not applicable.

Marine water mg/l	Not applicable.	During emission Resulting PEC local, water (mg/l): 1.892E-03; Annual average, Dissolved, Resulting PEC local, water (mg/l): 1.892E-03	Not applicable.
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.	7.083-02	During emission
Marine water sediment mg/kg dwt	Not applicable.	7.148E-03	During emission
	Local concentration	**PEC soil (local+regional)**	**Justification**
Agricultural soil averaged mg/kg dwt	Not applicable.	3.895E-03, 30 days;3.848E-03, 180 days	Not applicable.
Grassland averaged mg/kg dwt	Not applicable.	3.810E-03, 180 days	Not applicable.
Groundwater mg/l	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC air (local+regional)**	**Justification**
During emission mg/m³	Not applicable.	Not applicable.	Not applicable.
Annual average mg/m³	Not applicable.	1.601E-11	Not applicable.
Annual deposition mg/m²/d	Not applicable.	Not applicable.	Not applicable.
	Local concentration	**PEC aquatic (local+regional)**	**Justification**
Micro-organism mg/l	Not applicable.	1.180E-01	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 0: 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	Cooling cured articles	0.34	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Cooling cured articles	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Cooling cured articles	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Cooling cured articles	6.46	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Cooling cured articles	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

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

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Roller, spreader, flow application	1.37	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Roller, spreader, flow application	1.62	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Roller, spreader, flow application	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Roller, spreader, flow application	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Roller, spreader, flow application	Not applicable	Not applicable.

Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 2: Non industrial spraying

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Spraying	1.29	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Spraying	1.94	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Spraying	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Spraying	6.46	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Spraying	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 3: Use of blowing agents in manufacture of foam

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Spraying	0.03	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Spraying	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Spraying	Not applicable	Not applicable.
Short term exposure, Systemic, Inhalable	Spraying	6.46	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Spraying	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	Not applicable.	Not applicable.	Not applicable.

Section 3:.2 Workers - Exposure estimation

Contributing scenario controlling worker exposure for 4: Hand-mixing with intimate contact and only PPE available

Route of exposure	Contributing scenarios	Dose/Concentration	Justification
Long term exposure, Systemic, Dermal	Mixing operations (open systems)	1.70	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Long term exposure, Systemic, Inhalable	Mixing operations (open systems)	0.97	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
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.
Short term exposure, Systemic, Dermal	Mixing operations (open systems)	Not applicable	Not applicable.

Short term exposure, Systemic, Inhalable	Mixing operations (open systems)	3.23	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.
Short term exposure, Systemic, Combined	Not applicable.	Not applicable.	Not applicable.
Short term exposure, Local, Dermal	Mixing operations (open systems)	Not applicable	Not applicable.
Short term exposure, Local, Inhalable	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.