

SAFETY DATA SHEET



Ethylenediamine, EDA

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

1.1 Product identifier

Product name : Ethylenediamine, EDA**Index number** : 612-006-00-6**EC number** : 203-468-6**REACH Registration number**

Registration number	Legal entity
01-2119480383-37-0001	-

CAS number : 107-15-3**Other means of identification** : -**Chemical formula** : C2-H8-N2

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

Product use : Intermediate. Chemical synthesis.

Identified uses
ES01: Manufacture of substance - Industrial: SU03; PROC01, PROC02, PROC08a, PROC08b, PROC15; ERC01
ES02: Use as an intermediate - Industrial: SU03; PROC01, PROC02, PROC03, PROC04, PROC15; ERC06a, ERC06c
ES03: Formulation - Industrial: SU10; PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02
ES04: Use as a processing aid/additive - Industrial: SU03; PROC01, PROC02, PROC03; ERC04, ERC07
ES05: Use as a processing aid/additive - Professional: SU22; PROC20; ERC09a, ERC09b
ES06: Monomer use in epoxy, PU, adhesives, coatings and other polymers - Industrial: SU03; PROC05, PROC07, PROC08a, PROC10, PROC13, PROC14, PROC19, PROC24; ERC05, ERC06a, ERC06b, ERC06c, ERC06d
ES07: Monomer use in epoxy, PU, adhesives, coatings and other polymers - Professional: SU22; PROC05, PROC08a, PROC10, PROC11, PROC13, PROC14, PROC19, PROC24; ERC08c, ERC08f

See Annex to the Safety data sheet for additional information in the Exposure Scenario(s).

1.3 Details of the supplier of the safety data sheet

Delamine B.V.

Barchman Wuytierslaan 10

3818 LH Amersfoort

Netherlands

Telephone number: +31-334224600

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 h)

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]

Flam. Liq. 3, H226
 Acute Tox. 4, H302
 Acute Tox. 3, H311
 Acute Tox. 4, H332
 Skin Corr. 1B, H314
 Eye Dam. 1, H318
 Resp. Sens. 1B, H334
 Skin Sens. 1B, H317
 Aquatic Chronic 3, H412

The product is classified as hazardous according to Regulation (EC) 1272/2008 as amended.

See Section 16 for the full text of the 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 : H226 - Flammable liquid and vapour.
 H311 - Toxic in contact with skin.
 H302 + H332 - Harmful if swallowed or if inhaled.
 H314 - Causes severe skin burns and eye damage.
 H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled.
 H317 - May cause an allergic skin reaction.
 H412 - Harmful to aquatic life with long lasting effects.

Precautionary statements

Prevention : P280 - Wear protective gloves. Wear eye or face protection. Wear protective clothing.
 P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
 P260 - Do not breathe vapour.

Response : P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
 P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
 P303 + P361 + P353 + P310 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Immediately call a POISON CENTER or physician.
 P305 + P351 + P338 + P310 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.

Storage : P403 + P235 - Store in a well-ventilated place. Keep cool.

Disposal : Not applicable.

Hazardous ingredients : ethylenediamine

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.

Ethylenediamine, EDA

SECTION 2: Hazards identification**2.3 Other hazards**

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

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

Other hazards which do not result in classification : None known.

SECTION 3: Composition/information on ingredients**3.1 Substances** : Mono-constituent substance

Product/ingredient name	Identifiers	%	Regulation (EC) No. 1272/2008 [CLP]	Type
ethylenediamine	REACH #: 01-2119480383-37 EC: 203-468-6 CAS: 107-15-3 Index: 612-006-00-6	100	Flam. Liq. 3, H226 Acute Tox. 4, H302 Acute Tox. 3, H311 Acute Tox. 4, H332 Skin Corr. 1B, H314 Eye Dam. 1, H318 Resp. Sens. 1B, H334 Skin Sens. 1B, H317 Aquatic Chronic 3, H412 See Section 16 for the full text of the H statements declared above.	[A]

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.

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. In the event of any complaints or symptoms, avoid further exposure.

SECTION 4: First aid measures

- 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** : Harmful if inhaled. May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- Skin contact** : Causes severe burns. Toxic in contact with skin. May cause an allergic skin reaction.
- Ingestion** : Harmful if swallowed.

Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:
pain
watering
redness
- Inhalation** : Adverse symptoms may include the following:
wheezing and breathing difficulties
asthma
- Skin contact** : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur
- Ingestion** : Adverse symptoms may include the following:
stomach pains

4.3 Indication of any immediate medical attention and special treatment needed

- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Specific treatments** : No specific treatment.

SECTION 5: Firefighting measures**5.1 Extinguishing media**

- Suitable extinguishing media** : Use dry chemical, CO₂, water spray (fog) or foam. Dry sand or other suitable absorbent. Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : Do not use water jet.

SECTION 5: Firefighting measures

5.2 Special hazards arising from the substance or mixture

- Hazards from the substance or mixture** : Flammable liquid and vapour. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapour/gas is heavier than air and will spread along the ground. Vapours may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. 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 combustion 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. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- 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.
- Additional information (Explosibility)** : Not considered to be a product presenting a risk of explosion.

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. Shut off all ignition sources. No flares, smoking or flames in hazard area. 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 material for containment and cleaning up

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

SECTION 6: Accidental release measures

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

7.1 Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitisation problems or asthma, allergies or chronic or recurrent respiratory disease 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. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Keep away from acids. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

7.2 Conditions for safe storage, including any incompatibilities

Store in accordance with local regulations. Store in a segregated and approved area. 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. Eliminate all ignition sources. Separate from acids. Separate from oxidizing materials. 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 Directive - Reporting thresholds (in tonnes)

Danger criteria

Category	Notification and MAPP threshold	Safety report threshold
P5c: Flammable liquids 2 and 3 not falling under P5a or P5b	5000	50000

7.3 Specific end use(s)

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).

SECTION 8: Exposure controls/personal protection

The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

8.1 Control parameters

Occupational exposure limits

No exposure limit value known.

SECTION 8: Exposure controls/personal protection

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to 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
ethylenediamine	DNEL	Short term Dermal	5 mg/kg bw/day	Workers	Systemic
	DNEL	Short term Inhalation	35 mg/m ³	Workers	Systemic
	DNEL	Long term Dermal	3.6 mg/kg bw/day	Workers	Systemic
	DNEL	Long term Inhalation	25 mg/m ³	Workers	Systemic
	DNEL	Long term Oral	0.27 mg/kg bw/day	Consumers	Systemic

PNECs

Product/ingredient name	Compartment Detail	Value	Method Detail
ethylenediamine	Fresh water	0.016 mg/l	Assessment Factors
	Marine water	0.002 mg/l	Assessment Factors
	Intermittent release	0.167 mg/l	Assessment Factors
	Fresh water sediment	7.68 mg/kg dwt	-
	Fresh water sediment	1.67 mg/kg wwt	-
	Marine water sediment	0.768 mg/kg dwt	-
	Marine water sediment	0.167 mg/kg wwt	-
	Soil	4.36 mg/kg dwt	-
	Soil	3.36 mg/kg wwt	-
	Sewage Treatment Plant	0.5 mg/l	Assessment Factors
Secondary Poisoning	4.9 mg/kg	-	

8.2 Exposure controls

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Individual protection measures

SECTION 8: Exposure controls/personal protection

- 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.
- Recommended: Wear suitable gloves tested to EN374.
> 8 hours (breakthrough time): butyl rubber (thickness ≥ 0.3 mm), nitrile rubber (thickness ≥ 0.4 mm), Chloroprene (thickness ≥ 0.65 mm).
- 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. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves. Refer to European Standard EN 1149 for further information on material and design requirements and test methods.
- 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.
- 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: Combination filtering device (DIN EN 14387), Filter type: A-P2.
- 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. [Viscous liquid.]
- Colour** : Colourless.
- Odour** : Mild. Ammoniacal.
- Odour threshold** : Not available.
- pH** : 12 [Conc. (% w/w): 1%]
- Melting point/freezing point** : 10.8 to 11°C
- Initial boiling point and boiling range** : 117°C
- Flash point** : Closed cup: 38 to 42°C
- Evaporation rate** : 0.91 (butyl acetate = 1)

Ethylenediamine, EDA

SECTION 9: Physical and chemical properties

Flammability (solid, gas)	: Not applicable.
Upper/lower flammability or explosive limits	: Lower: 2.7% Upper: 16.6%
Vapour pressure	: 1.3 kPa [room temperature]
Vapour density	: 2.07 [Air = 1]
Relative density	: Not available.
Density	: 0.897 g/cm ³ [20°C]
Solubility(ies)	: Not available.
Solubility in water	: 1000 g/l
Partition coefficient: n-octanol/ water	: -2 to -1.3
Auto-ignition temperature	: 385 to 405°C
Decomposition temperature	: Not available.
Viscosity	: Dynamic (room temperature): 1.265 to 1.725 mPa·s
Explosive properties	: Not considered to be a product presenting a risk of explosion.
Oxidising properties	: None.

9.2 Other information

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.
10.4 Conditions to avoid	: Avoid all possible sources of ignition (spark or flame). Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapour to accumulate in low or confined areas. aerosol or mist formation.
10.5 Incompatible materials	: Reactive or incompatible with the following materials: oxidizing materials, metals, 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	Remarks
ethylenediamine	LC50 Inhalation Vapour	Rat - Male	14.7 mg/l	4 hours	-
	LD50 Dermal	Rabbit - Male	560 mg/kg	-	-
	LD50 Oral [OECD 401]	Rat - Male, Female	866 mg/kg	-	-

Conclusion/Summary : Toxic in contact with skin. Harmful if swallowed or if inhaled.**Irritation/Corrosion**

Ethylenediamine, EDA

SECTION 11: Toxicological information

Product/ingredient name	Result	Species	Score	Exposure	Observation	Remarks
ethylenediamine	Skin - Visible necrosis	Rabbit	-	1 minutes	72 hours	-
	Eyes - Cornea opacity	Rabbit	3	-	8 days	-

Conclusion/Summary

Skin : Causes severe burns.
Eyes : Causes serious eye damage.

Sensitisation

Product/ingredient name	Route of exposure	Species	Result	Remarks
ethylenediamine	skin	Guinea pig	Sensitising	-
	Respiratory	Human	Sensitising	-

Conclusion/Summary

Skin : May cause an allergic skin reaction.
Respiratory : May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Mutagenicity

Product/ingredient name	Test	Experiment	Result	Remarks
ethylenediamine	-	Experiment: In vivo Subject: Mammalian-Animal Cell: Germ	Negative	-

Conclusion/Summary : Based on available data, the classification criteria are not met.

Carcinogenicity

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

Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility	Developmental toxin	Species	Dose	Exposure	Remarks
ethylenediamine	Negative	-	Negative	Rabbit	Oral: 80 mg/kg	-	test substance: CAS no. 333-18-6 (read-across)

Conclusion/Summary : Based on available data, the classification criteria are not met.

Teratogenicity

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

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye damage.
Inhalation : Harmful if inhaled. May cause allergy or asthma symptoms or breathing difficulties if inhaled.

SECTION 11: Toxicological information

- Skin contact** : Causes severe burns. Toxic in contact with skin. May cause an allergic skin reaction.
Ingestion : Harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:
 pain
 watering
 redness
- Inhalation** : Adverse symptoms may include the following:
 wheezing and breathing difficulties
 asthma
- Skin contact** : Adverse symptoms may include the following:
 pain or irritation
 redness
 blistering may occur
- Ingestion** : Adverse symptoms may include the following:
 stomach pains

Delayed and immediate effects as well as chronic effects from short and long-term exposure**Short term exposure**

- Potential immediate effects** : Not available.
Potential delayed effects : Not available.

Long term exposure

- Potential immediate effects** : Not available.
Potential delayed effects : Not available.

Potential chronic health effects

Product/ingredient name	Result	Species	Dose	Exposure	Remarks
ethylenediamine	Sub-chronic NOAEL Oral [OECD 408]	Rat - Male, Female	22 mg/kg	3 months	test substance: CAS no. 333-18-6 (read-across). Based on available data, the classification criteria are not met.
	Sub-chronic NOAEL Dermal	Mouse - Male	8.3 mg/kg	2 weeks; 3 days per week	-
	Sub-acute NOAEL Inhalation Vapour	Rat - Male, Female	144 mg/m ³	6 weeks; 7 hours per day	Based on available data, the classification criteria are not met.

- Conclusion/Summary** : Based on available data, the classification criteria are not met.
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.

- Other information** : Not available.

SECTION 12: Ecological information**12.1 Toxicity**

Product/ingredient name	Result	Species	Exposure	Remarks
ethylenediamine	Acute EC50 645 mg/l Fresh water	Algae	72 hours	-
	Acute EC50 16.7 mg/l Fresh water [EU C.2]	Daphnia - Daphnia magna	48 hours	-
	Acute LC50 640 mg/l [EU C.1]	Fish - Poecilia reticulata	96 hours	-
	Chronic NOEC 3.2 mg/l Fresh water	Algae	72 hours	-
	Chronic NOEC 0.16 mg/l Fresh water	Daphnia - Daphnia magna	21 days	-
	Chronic NOEC >10 mg/l Fresh water [OECD 210]	Fish - Gasterosteus aculeatus	28 days	-

Conclusion/Summary : Harmful to aquatic life with long lasting effects.

12.2 Persistence and degradability

Product/ingredient name	Test	Result	Dose	Inoculum
ethylenediamine	EU C.4	95 % - Readily - 28 days	-	-

Conclusion/Summary : Readily biodegradable.

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
ethylenediamine	-	-	Readily

12.3 Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
ethylenediamine	-2 to -1.3	-	low

12.4 Mobility in soil

Soil/water partition coefficient (K_{oc}) : 4766

Mobility : Low mobility in soil predicted, based on the log K_{oc} value.

12.5 Results of PBT and vPvB assessment

PBT : No.
P: No. B: No. T: No.

vPvB : No.
vP: No. vB: 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. The allocation of waste identity numbers/waste descriptions must be carried out according to the EEC, specific to the industry and process.

Packaging

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

Special precautions : This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapour from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. 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	UN1604	UN1604	UN1604	UN1604
14.2 UN proper shipping name	ETHYLENEDIAMINE	ETHYLENEDIAMINE	ETHYLENEDIAMINE	Ethylenediamine
14.3 Transport hazard class(es)	8 (3)	8 (3)	8 (3)	8 (3)
Label				
14.4 Packing group	II	II	II	II
14.5 Environmental hazards	No.	Yes.	Marine Pollutant: No	No.
Additional information	<p>Hazard identification number 83</p> <p>Limited quantity 1 L</p> <p>Tunnel code (D/E)</p>	The product is only regulated as an environmentally hazardous substance when transported in tank vessels.	<p>Emergency schedules (EmS) F-E, S-C</p>	<p>Passenger and Cargo Aircraft Quantity limitation: 1 L Packaging instructions: 851</p> <p>Cargo Aircraft Only Quantity limitation: 30 L Packaging instructions: 855</p> <p>Limited Quantities - Passenger Aircraft Quantity limitation: 0.5 L Packaging</p>

Ethylenediamine, EDA

SECTION 14: Transport information

instructions: Y840

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 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

Annex XIV

None of the components are listed.

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 : This material is listed or exempted.

Ozone depleting substances (1005/2009/EU)

Not listed.

Prior Informed Consent (PIC) (649/2012/EU)

Not listed.

Seveso Directive

This product is controlled under the Seveso Directive.

Danger criteria

Category

P5c: Flammable liquids 2 and 3 not falling under P5a or P5b

National regulations

Hazchem code : •2W

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

International lists

SECTION 15: Regulatory information

National inventory

Australia	: This material is listed or exempted.
Canada	: This material is listed or exempted.
China	: This material is listed or exempted.
Japan	: Japan inventory (ENCS): This material is listed or exempted. Japan inventory (ISHL): This material is listed or exempted.
Malaysia	: This material is listed or exempted.
New Zealand	: This material is listed or exempted.
Philippines	: This material is listed or exempted.
Republic of Korea	: This material is listed or exempted.
Taiwan	: This material is listed or exempted.
Turkey	: This material is listed or exempted.
United States	: This material is listed or exempted.

15.2 Chemical safety assessment : Complete.

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

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

Classification	Justification
Flam. Liq. 3, H226	Expert judgment
Acute Tox. 4, H302	On basis of test data
Acute Tox. 3, H311	On basis of test data
Acute Tox. 4, H332	On basis of test data
Skin Corr. 1B, H314	Expert judgment
Eye Dam. 1, H318	On basis of test data
Resp. Sens. 1B, H334	Expert judgment
Skin Sens. 1B, H317	Expert judgment
Aquatic Chronic 3, H412	On basis of test data

Full text of abbreviated H statements

H226	Flammable liquid and vapour.
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.
H332	Harmful if inhaled.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H412	Harmful to aquatic life with long lasting effects.

Full text of classifications [CLP/GHS]

Ethylenediamine, EDA

SECTION 16: Other information

Acute Tox. 3, H311 Acute Tox. 4, H302 Acute Tox. 4, H332 Aquatic Chronic 3, H412 Eye Dam. 1, H318 Flam. Liq. 3, H226 Resp. Sens. 1B, H334 Skin Corr. 1B, H314 Skin Sens. 1B, H317	ACUTE TOXICITY (dermal) - Category 3 ACUTE TOXICITY (oral) - Category 4 ACUTE TOXICITY (inhalation) - Category 4 LONG-TERM AQUATIC HAZARD - Category 3 SERIOUS EYE DAMAGE/EYE IRRITATION - Category 1 FLAMMABLE LIQUIDS - Category 3 RESPIRATORY SENSITISATION - Category 1B SKIN CORROSION/IRRITATION - Category 1B SKIN SENSITISATION - Category 1B
---	---

Date of printing : 04/10/2017

Date of issue/ Date of revision : 04/10/2017

Date of previous issue : 25/06/2015

Version : 10

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Mono-constituent substance
Product name : Ethylenediamine, EDA

Section 1 - Title

Short title of the exposure scenario : Manufacture of substance - Industrial.

List of use descriptors : **Identified use name: ES01:** Manufacture of substance - Industrial: SU03; PROC01, PROC02, PROC08a, PROC08b, PROC15; ERC01
Process Category: PROC01, PROC02, PROC08a, PROC08b, PROC15
Substance supplied to that use in form of: As such
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC01

Environmental contributing scenarios : **ERC01 - Manufacture of substances**

Health Contributing scenarios : **PROC01 - Use in closed process, no likelihood of exposure**
PROC02 - Use in closed, continuous process with occasional controlled exposure
PROC08a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC08b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC15 - Use as laboratory reagent

Number of the ES	: 1
-------------------------	-----

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: ERC01 - Manufacture of substances

Amounts used : Amounts used: 100440 tonnes/year.
 Fraction used at main source: 50%.
 Regional use tonnage: 100%.

Frequency and duration of use : 365 days.

Environment factors not influenced by risk management : River flow rate: 18000 m³/d.

Other conditions affecting environmental exposure : Release to air from process: 0.1%.
 Release to waste water from process: 0.2%.
 Release to soil from process: 0%.

Technical conditions and measures at process level (source) to prevent release : Wet scrubber - gas removal (Scrubber water should be led to waste).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Waste water treatment: Sewage Treatment Plant.
 Incineration, Ion exchange, Efficiency of at least 98.8%.

Organisational measures to prevent/limit release from site : Do not allow to enter drains or watercourses. Do not allow contact with soil, surface or groundwater.

Ethylenediamine, EDA	Exposure Scenario: 1	Manufacture of substance - Industrial.
Conditions and measures related to sewage treatment plant	: Discharge rate: 2000 m ³ /d. : No application of sewage sludge to soil. : Maximum release for RCR < 1: 3.3 kg/day. : Scaling factors: Dilution factor: > 820 --> No additional RMM necessary for RCR < 1.	
Contributing scenario controlling worker exposure for 2: PROC01 - Use in closed process, no likelihood of exposure		
Product characteristics	: Vapour pressure: 1300 Pa.	
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.	
Physical state	: Medium volatile liquid.	
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. : Frequency: ≤ 240 days per year.	
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of one hand (240 cm ²).	
Other conditions affecting workers exposure	: Outdoor use / Indoor use.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.	
Personal protection	: Use suitable eye protection. : Wear suitable protective clothing. : Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).	
Contributing scenario controlling worker exposure for 3: PROC02 - Use in closed, continuous process with occasional controlled exposure		
Product characteristics	: Vapour pressure: 1300 Pa.	
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.	
Physical state	: Medium volatile liquid.	
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. : Frequency: ≤ 240 days per year.	
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).	
Other conditions affecting workers exposure	: Outdoor use.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.	
Personal protection	: Use suitable eye protection. : Wear suitable protective clothing. : Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).	
Contributing scenario controlling worker exposure for 4: PROC08a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
Product characteristics	: Vapour pressure: 1300 Pa.	
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.	
Physical state	: Medium volatile liquid.	
Frequency and duration of use/exposure	: Exposure duration per day: < 15 min/day. : Frequency: ≤ 240 days per year.	
Date of issue/Date of revision	: 04/10/2017	Version : 10 / en 18/60

Ethylenediamine, EDA	Exposure Scenario: 1	Manufacture of substance - Industrial.
Human factors not influenced by risk management	:	Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	:	Outdoor use.
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	:	Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	:	Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).
Contributing scenario controlling worker exposure for 5: PROC08b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities		
Product characteristics	:	Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	:	Covers percentage substance in the product up to 100%.
Physical state	:	Medium volatile liquid.
Frequency and duration of use/exposure	:	Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	:	Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	:	Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation - efficiency of at least 97%.
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	:	Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	:	Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).
Contributing scenario controlling worker exposure for 6: PROC15 - Use as laboratory reagent		
Product characteristics	:	Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	:	Covers percentage substance in the product up to 100%.
Physical state	:	Medium volatile liquid.
Frequency and duration of use/exposure	:	Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	:	Exposed skin surface assumed: Palm of one hand (240 cm ²).
Other conditions affecting workers exposure	:	Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation - efficiency of at least 90%. Handle in a fume cupboard.
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	:	Ensure good industrial hygiene. Wash hands before breaks and after work.

Ethylenediamine, EDA	Exposure Scenario: 1	Manufacture of substance - Industrial.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).	

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: ERC01 - Manufacture of substances		
Exposure assessment (environment):	: EUSES	
Exposure estimation	: Freshwater: 0.0159 mg/l. Risk characterisation ratio (PEC/PNEC): 0.99.	
	Freshwater sediment: 1.66 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.99.	
	Marine water: 0.00159 mg/l. Risk characterisation ratio (PEC/PNEC): 0.99.	
	Marine water sediment: 0.166 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.99.	
	Sewage Treatment Plant: 0.15 mg/l. Risk characterisation ratio (PEC/PNEC): 0.31.	
	Soil: 0.100 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.030.	
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 2: PROC01 - Use in closed process, no likelihood of exposure		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.0068 mg/kg bw/day. Risk characterisation ratio: 0.002.	
	Worker - inhalative, long-term - systemic: < 0.1 mg/m ³ . Risk characterisation ratio: 0.004.	
	Worker - combined, long-term - systemic: 0.006.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 3: PROC02 - Use in closed, continuous process with occasional controlled exposure		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.027 mg/kg bw/day. Risk characterisation ratio: 0.008.	
	Worker - inhalative, long-term - systemic: < 0.1 mg/m ³ . Risk characterisation ratio: 0.004.	
	Worker - combined, long-term - systemic: 0.012.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 4: PROC08a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Exposure assessment (human): : ECETOC TRA v2.0 worker; modified version

Exposure estimation : **Worker - dermal, long-term - systemic:** 0.069 mg/kg bw/day.
Risk characterisation ratio: 0.02.

Worker - inhalative, long-term - systemic: < 0.1 mg/m³.
Risk characterisation ratio: 0.004.

Worker - combined, long-term - systemic: 0.027.

Remark : Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 5: PROC08b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Exposure assessment (human): : ECETOC TRA v2.0 worker; modified version

Exposure estimation : **Worker - dermal, long-term - systemic:** 0.0137 mg/kg bw/day.
Risk characterisation ratio: 0.004.

Worker - inhalative, long-term - systemic: < 0.2 mg/m³.
Risk characterisation ratio: 0.008.

Worker - combined, long-term - systemic: 0.012.

Remark : Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: PROC15 - Use as laboratory reagent

Exposure assessment (human): : ECETOC TRA v2.0 worker; modified version

Exposure estimation : **Worker - dermal, long-term - systemic:** 0.0007 mg/kg bw/day.
Risk characterisation ratio: 0.0002.

Worker - inhalative, long-term - systemic: < 0.1 mg/m³.
Risk characterisation ratio: 0.004.

Worker - combined, long-term - systemic: 0.004.

Remark : Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Section 4 - Guidance to DU to evaluate whether he works inside the boundaries set by the ES

General	: The immediate downstream user is required to evaluate whether the operational conditions and risk management measures described in the exposure scenario fit to his use. If other OC/RMM are adopted, the user has to ensure that risks are managed to at least equivalent levels. The risk assessment methods/tools given in section 3 may be used for this evaluation.
Environment	: Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Mono-constituent substance
Product name : Ethylenediamine, EDA

Section 1 - Title

Short title of the exposure scenario : Use as an intermediate - Industrial.

List of use descriptors : **Identified use name: ES02:** Use as an intermediate - Industrial: SU03; PROC01, PROC02, PROC03, PROC04, PROC15; ERC06a, ERC06c
Process Category: PROC01, PROC02, PROC03, PROC04, PROC15
Substance supplied to that use in form of: As such
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC06a, ERC06c

Environmental contributing scenarios : **ERC06a - Industrial use resulting in manufacture of another substance (use of intermediates)**
ERC06c - Industrial use of monomers for manufacture of thermoplastics

Health Contributing scenarios : **PROC01 - Use in closed process, no likelihood of exposure**
PROC02 - Use in closed, continuous process with occasional controlled exposure
PROC03 - Use in closed batch process (synthesis or formulation)
PROC04 - Use in batch and other process (synthesis) where opportunity for exposure arises
PROC15 - Use as laboratory reagent

Number of the ES	: 2
-------------------------	-----

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: ERC06a - Industrial use resulting in manufacture of another substance (use of intermediates)

Amounts used : Amounts used: 100440 tonnes/year.
 Fraction used at main source: 10%.
 Regional use tonnage: 100%.

Frequency and duration of use : 365 days.

Environment factors not influenced by risk management : River flow rate: 18000 m³/d.

Other conditions affecting environmental exposure : Release to air from process: 0.1%.
 Release to waste water from process: 0.2%.
 Release to soil from process: 0%.

Technical conditions and measures at process level (source) to prevent release : Wet scrubber - gas removal (Scrubber water should be led to waste).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Waste water treatment: Sewage Treatment Plant.
 Incineration, Ion exchange, Efficiency of at least 93.9%.

Organisational measures to prevent/limit release from site : Do not allow to enter drains or watercourses. Do not allow contact with soil, surface or groundwater.

Ethylenediamine, EDA	Exposure Scenario: 2	Use as an intermediate - Industrial.
Conditions and measures related to sewage treatment plant	: Discharge rate: 2000 m ³ /d. No application of sewage sludge to soil. Maximum release for RCR < 1: 3.4 kg/day. Scaling factors: Dilution factor: > 164 --> No additional RMM necessary for RCR < 1.	
Contributing scenario controlling environmental exposure for 2: ERC06c - Industrial use of monomers for manufacture of thermoplastics		
Amounts used	: Amounts used: 100440 tonnes/year. Fraction used at main source: 1%. Regional use tonnage: 100%.	
Frequency and duration of use	: 220 days.	
Environment factors not influenced by risk management	: River flow rate: 18000 m ³ /d.	
Other conditions affecting environmental exposure	: Release to air from process: 0.1%. Release to waste water from process: 0.7%. Release to soil from process: 0%.	
Technical conditions and measures at process level (source) to prevent release	: Wet scrubber - gas removal (Scrubber water should be led to waste).	
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil	: Waste water treatment: Sewage Treatment Plant. Incineration, Ion exchange, Efficiency of at least 89.5%.	
Organisational measures to prevent/limit release from site	: Do not allow to enter drains or watercourses. Do not allow contact with soil, surface or groundwater.	
Conditions and measures related to sewage treatment plant	: Discharge rate: 2000 m ³ /d. No application of sewage sludge to soil. Maximum release for RCR < 1: 3.4 kg/day. Scaling factors: Dilution factor: > 95 --> No additional RMM necessary for RCR < 1.	
Contributing scenario controlling worker exposure for 3: PROC01 - Use in closed process, no likelihood of exposure		
Product characteristics	: Vapour pressure: 1300 Pa.	
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.	
Physical state	: Medium volatile liquid.	
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.	
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of one hand (240 cm ²).	
Other conditions affecting workers exposure	: Outdoor use / Indoor use.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.	
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).	

Contributing scenario controlling worker exposure for 4: PROC02 - Use in closed, continuous process with occasional controlled exposure

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.
Physical state	: Medium volatile liquid.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	: Outdoor use.
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 90%.

Conditions and measures related to personal protection, hygiene and health evaluation

Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 5: PROC03 - Use in closed batch process (synthesis or formulation)

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.
Physical state	: Medium volatile liquid.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of one hand (240 cm ²).
Other conditions affecting workers exposure	: Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 90%.

Conditions and measures related to personal protection, hygiene and health evaluation

Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 6: PROC04 - Use in batch and other process (synthesis) where opportunity for exposure arises

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.
Physical state	: Medium volatile liquid.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	: Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 90%.

Conditions and measures related to personal protection, hygiene and health evaluation

Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 7: PROC15 - Use as laboratory reagent

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.
Physical state	: Medium volatile liquid.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of one hand (240 cm ²).
Other conditions affecting workers exposure	: Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 90%. Handle in a fume cupboard.

Conditions and measures related to personal protection, hygiene and health evaluation

Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: ERC06a - Industrial use resulting in manufacture of another substance (use of intermediates)

Exposure assessment (environment): : EUSES

Exposure estimation : Freshwater: 0.0159 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.99.

Freshwater sediment: 1.66 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.99.

Marine water: 0.00159 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.99.

Marine water sediment: 0.166 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.99.

Sewage Treatment Plant: 0.14 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.30.

Soil: 0.031 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.009.

Remark : Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Environment: 2: ERC06c - Industrial use of monomers for manufacture of thermoplastics

Exposure assessment (environment): : EUSES

Exposure estimation : Freshwater: 0.0159 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.99.

Freshwater sediment: 1.66 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.99.

Marine water: 0.00159 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.99.

Marine water sediment: 0.166 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.99.

Sewage Treatment Plant: 0.14 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.30.

Soil: 0.031 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.009.

Remark : Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 3: PROC01 - Use in closed process, no likelihood of exposure

Exposure assessment (human): : ECETOC TRA v2.0 worker; modified version

Exposure estimation : **Worker - dermal, long-term - systemic:** 0.0068 mg/kg bw/day.
Risk characterisation ratio: 0.0019.

Worker - inhalative, long-term - systemic: 0.025 mg/m³.
Risk characterisation ratio: 0.001.

Worker - combined, long-term - systemic: 0.0029.

Remark : Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Ethylenediamine, EDA	Exposure Scenario: 2	Use as an intermediate - Industrial.
Exposure estimation and reference to its source - Workers: 4: PROC02 - Use in closed, continuous process with occasional controlled exposure		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.0027 mg/kg bw/day. Risk characterisation ratio: 0.0008.	
	: Worker - inhalative, long-term - systemic: 2.506 mg/m ³ . Risk characterisation ratio: 0.1.	
	: Worker - combined, long-term - systemic: 0.100.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 5: PROC03 - Use in closed batch process (synthesis or formulation)		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.0007 mg/kg bw/day. Risk characterisation ratio: 0.0002.	
	: Worker - inhalative, long-term - systemic: 6.265 mg/m ³ . Risk characterisation ratio: 0.2505.	
	: Worker - combined, long-term - systemic: 0.2507.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 6: PROC04 - Use in batch and other process (synthesis) where opportunity for exposure arises		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.014 mg/kg bw/day. Risk characterisation ratio: 0.003.	
	: Worker - inhalative, long-term - systemic: 5.012 mg/m ³ . Risk characterisation ratio: 0.200.	
	: Worker - combined, long-term - systemic: 0.204.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 7: PROC15 - Use as laboratory reagent		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.0007 mg/kg bw/day. Risk characterisation ratio: 0.0002.	
	: Worker - inhalative, long-term - systemic: 2.506 mg/m ³ . Risk characterisation ratio: 0.1002.	
	: Worker - combined, long-term - systemic: 0.1004.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Section 4 - Guidance to DU to evaluate whether he works inside the boundaries set by the ES

General

: The immediate downstream user is required to evaluate whether the operational conditions and risk management measures described in the exposure scenario fit to his use. If other OC/RMM are adopted, the user has to ensure that risks are managed to at least equivalent levels. The risk assessment methods/tools given in section 3 may be used for this evaluation.

Environment

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Mono-constituent substance
Product name : Ethylenediamine, EDA

Section 1 - Title

Short title of the exposure scenario : Formulation - Industrial.

List of use descriptors : **Identified use name: ES03:** Formulation - Industrial: SU10; PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02
Process Category: PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC15
Substance supplied to that use in form of: As such
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC02

Environmental contributing scenarios : **ERC02 - Formulation of preparations**

Health Contributing scenarios : **PROC03 - Use in closed batch process (synthesis or formulation)**
PROC04 - Use in batch and other process (synthesis) where opportunity for exposure arises
PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC08a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC08b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC09 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC15 - Use as laboratory reagent

Number of the ES	: 3
-------------------------	-----

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: ERC02 - Formulation of preparations

Amounts used	: Amounts used: 14044 tonnes/year. Fraction used at main source: 10%. Regional use tonnage: 100%.
Frequency and duration of use	: 220 days.
Environment factors not influenced by risk management	: River flow rate: 18000 m ³ /d.
Other conditions affecting environmental exposure	: Release to air from process: 0.025%. Release to waste water from process: 0.5%. Release to soil from process: 0.01%. ESVOC SPERC 2.2.v1, Modified version.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil	: Waste water treatment: Sewage Treatment Plant. Incineration, Ion exchange, Efficiency of at least 85%.
Organisational measures to prevent/limit release from site	: Do not allow to enter drains or watercourses. Do not allow contact with soil, surface or groundwater.

Ethylenediamine, EDA	Exposure Scenario: 3	Formulation - Industrial.
Conditions and measures related to sewage treatment plant	: Discharge rate: 2000 m ³ /d. : No application of sewage sludge to soil. : Maximum release for RCR < 1: 3.4 kg/day. : Scaling factors: Dilution factor: > 89.5 --> No additional RMM necessary for RCR < 1.	
Contributing scenario controlling worker exposure for 2: PROC03 - Use in closed batch process (synthesis or formulation)		
Product characteristics	: Vapour pressure: 1300 Pa.	
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.	
Physical state	: Medium volatile liquid.	
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. : Frequency: ≤ 240 days per year.	
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of one hand (240 cm ²).	
Other conditions affecting workers exposure	: Indoor use.	
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 90%.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.	
Personal protection	: Use suitable eye protection. : Wear suitable protective clothing. : Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).	
Contributing scenario controlling worker exposure for 3: PROC04 - Use in batch and other process (synthesis) where opportunity for exposure arises		
Product characteristics	: Vapour pressure: 1300 Pa.	
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.	
Physical state	: Medium volatile liquid.	
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. : Frequency: ≤ 240 days per year.	
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).	
Other conditions affecting workers exposure	: Indoor use.	
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 90%.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.	
Personal protection	: Use suitable eye protection. : Wear suitable protective clothing. : Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).	

Contributing scenario controlling worker exposure for 4: PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.
Physical state	: Medium volatile liquid.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	: Indoor use. Open surface: 0.3 - 1 m ² (ART). Room size: Any (ART).
Technical conditions and measures at process level (source) to prevent release	: Containment: Medium (Effectiveness of containment: 90%, ART). Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces (ART).
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 50%. Ensure fixed capturing hood is used. (ART) Mechanical ventilation giving at least 1 ach (air changes per hour) (ART).
Conditions and measures related to personal protection, hygiene and health evaluation	
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 5: PROC08a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.
Physical state	: Medium volatile liquid.
Frequency and duration of use/exposure	: Exposure duration per day: < 15 min/day. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Both hands (960 cm ²).
Other conditions affecting workers exposure	: Outdoor use.
Conditions and measures related to personal protection, hygiene and health evaluation	
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 6: PROC08b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.
Physical state	: Medium volatile liquid.
Frequency and duration of use/exposure	: Exposure duration per day: 1 - 4 hours per day. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	: Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 97%.

Conditions and measures related to personal protection, hygiene and health evaluation

Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 7: PROC09 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Concentration of the substance in the mixture: 1 - 5%.
Physical state	: Medium volatile liquid.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	: Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 90%.

Conditions and measures related to personal protection, hygiene and health evaluation

Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Ethylenediamine, EDA	Exposure Scenario: 3	Formulation - Industrial.
Contributing scenario controlling worker exposure for 8: PROC15 - Use as laboratory reagent		
Product characteristics	: Vapour pressure: 1300 Pa.	
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 100%.	
Physical state	: Medium volatile liquid.	
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.	
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).	
Other conditions affecting workers exposure	: Indoor use.	
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 90%.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.	
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).	

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: ERC02 - Formulation of preparations		
Exposure assessment (environment):	: EUSES	
Exposure estimation	: Freshwater: 0.0156 mg/l. Risk characterisation ratio (PEC/PNEC): 0.97.	
	Freshwater sediment: 1.63 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.97.	
	Marine water: 0.00156 mg/l. Risk characterisation ratio (PEC/PNEC): 0.97.	
	Marine water sediment: 0.163 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.97.	
	Sewage Treatment Plant: 0.15 mg/l. Risk characterisation ratio (PEC/PNEC): 0.31.	
	Soil: 0.11 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.032.	
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 2: PROC03 - Use in closed batch process (synthesis or formulation)

Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
-------------------------------------	--	--

Ethylenediamine, EDA	Exposure Scenario: 3	Formulation - Industrial.
Exposure estimation	<p>Worker - dermal, long-term - systemic: 0.0007 mg/kg bw/day. Risk characterisation ratio: 0.0002.</p> <p>Worker - inhalative, long-term - systemic: 6.265 mg/m³. Risk characterisation ratio: 0.250.</p> <p>Worker - combined, long-term - systemic: 0.250.</p>	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 3: PROC04 - Use in batch and other process (synthesis) where opportunity for exposure arises		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	<p>Worker - dermal, long-term - systemic: 0.014 mg/kg bw/day. Risk characterisation ratio: 0.004.</p> <p>Worker - inhalative, long-term - systemic: 5.012 mg/m³. Risk characterisation ratio: 0.200.</p> <p>Worker - combined, long-term - systemic: 0.204.</p>	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 4: PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)		
Exposure assessment (human):	: Dermal: ECETOC TRA v2.0 worker; modified version. Inhalation: ART v1.0.	
Exposure estimation	<p>Worker - dermal, long-term - systemic: 0.0014 mg/kg bw/day. Risk characterisation ratio: 0.0004.</p> <p>Worker - inhalative, long-term - systemic: 2.6 mg/m³. Risk characterisation ratio: 0.104.</p> <p>Worker - combined, long-term - systemic: 0.1044.</p>	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 5: PROC08a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	<p>Worker - dermal, long-term - systemic: 0.27 mg/kg bw/day. Risk characterisation ratio: 0.076.</p> <p>Worker - inhalative, long-term - systemic: 8.77 mg/m³. Risk characterisation ratio: 0.35.</p> <p>Worker - combined, long-term - systemic: 0.427.</p>	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 6: PROC08b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	

Ethylenediamine, EDA	Exposure Scenario: 3	Formulation - Industrial.
Exposure estimation	<p>Worker - dermal, long-term - systemic: 0.014 mg/kg bw/day. Risk characterisation ratio: 0.004.</p> <p>Worker - inhalative, long-term - systemic: 2.255 mg/m³. Risk characterisation ratio: 0.090.</p> <p>Worker - combined, long-term - systemic: 0.094.</p>	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 7: PROC09 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	<p>Worker - dermal, long-term - systemic: 0.014 mg/kg bw/day. Risk characterisation ratio: 0.004.</p> <p>Worker - inhalative, long-term - systemic: 2.506 mg/m³. Risk characterisation ratio: 0.100.</p> <p>Worker - combined, long-term - systemic: 0.104.</p>	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 8: PROC15 - Use as laboratory reagent		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	<p>Worker - dermal, long-term - systemic: 0.0007 mg/kg bw/day. Risk characterisation ratio: 0.0002.</p> <p>Worker - inhalative, long-term - systemic: 2.506 mg/m³. Risk characterisation ratio: 0.1002.</p> <p>Worker - combined, long-term - systemic: 0.1004.</p>	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Section 4 - Guidance to DU to evaluate whether he works inside the boundaries set by the ES

General	: The immediate downstream user is required to evaluate whether the operational conditions and risk management measures described in the exposure scenario fit to his use. If other OC/RMM are adopted, the user has to ensure that risks are managed to at least equivalent levels. The risk assessment methods/tools given in section 3 may be used for this evaluation.
Environment	: Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Mono-constituent substance
Product name : Ethylenediamine, EDA

Section 1 - Title

Short title of the exposure scenario : Use as a processing aid/additive - Industrial.

List of use descriptors : **Identified use name: ES04:** Use as a processing aid/additive - Industrial: SU03; PROC01, PROC02, PROC03; ERC04, ERC07
Process Category: PROC01, PROC02, PROC03
Substance supplied to that use in form of: In a mixture
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC04, ERC07

Environmental contributing scenarios : **ERC04 - Industrial use of processing aids in processes and products, not becoming part of articles**
ERC07 - Industrial use of substances in closed systems

Health Contributing scenarios : **PROC01 - Use in closed process, no likelihood of exposure**
PROC02 - Use in closed, continuous process with occasional controlled exposure
PROC03 - Use in closed batch process (synthesis or formulation)

Number of the ES	: 4
-------------------------	-----

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: ERC04 - Industrial use of processing aids in processes and products, not becoming part of articles

Amounts used	: Amounts used: 22100 tonnes/year. Fraction used at main source: 10%. Regional use tonnage: 100%.
Frequency and duration of use	: 365 days.
Environment factors not influenced by risk management	: River flow rate: 18000 m ³ /d.
Other conditions affecting environmental exposure	: Release to air from process: 0.00025%. Release to waste water from process: 0%. Release to soil from process: 0%. ESVOC SPERC 7.12a.v1.
Technical conditions and measures at process level (source) to prevent release	: Wet scrubber - gas removal (Scrubber water should be led to waste).
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil	: Waste water treatment: Sewage Treatment Plant. Incineration, Ion exchange.
Organisational measures to prevent/limit release from site	: Do not allow to enter drains or watercourses. Do not allow contact with soil, surface or groundwater.
Conditions and measures related to sewage treatment plant	: Discharge rate: 2000 m ³ /d. No application of sewage sludge to soil.

Contributing scenario controlling environmental exposure for 2: ERC07 - Industrial use of substances in closed systems

Amounts used	: Amounts used: 22100 tonnes/year. M _{sp} perc: 500 kg/day. Fraction used at main source: 0.046%. Regional use tonnage: 100%.
Frequency and duration of use	: 20 days.
Environment factors not influenced by risk management	: River flow rate: 18000 m ³ /d.
Other conditions affecting environmental exposure	: Release to air from process: 0.01%. Release to waste water from process: 0.001%. Release to soil from process: 0.001%. ESVOC SPERC 7.13a.v1.
Technical conditions and measures at process level (source) to prevent release	: Wet scrubber - gas removal (Scrubber water should be led to waste).
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil	: Waste water treatment: Sewage Treatment Plant.
Organisational measures to prevent/limit release from site	: Do not allow to enter drains or watercourses. Do not allow contact with soil, surface or groundwater.
Conditions and measures related to sewage treatment plant	: Discharge rate: 2000 m ³ /d. No application of sewage sludge to soil. Maximum release for RCR < 1: 3.3 kg/day.

Contributing scenario controlling worker exposure for 3: PROC01 - Use in closed process, no likelihood of exposure

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Concentration of the substance in the mixture: 1 - 5%.
Physical state	: Medium volatile liquid, liquid preparations.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of one hand (240 cm ²).
Other conditions affecting workers exposure	: Outdoor use / Indoor use.
Conditions and measures related to personal protection, hygiene and health evaluation	
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 4: PROC02 - Use in closed, continuous process with occasional controlled exposure

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Concentration of the substance in the mixture: 1 - 5%.
Physical state	: Medium volatile liquid, liquid preparations.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	: Outdoor use / Indoor use.
Conditions and measures related to personal protection, hygiene and health evaluation	
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 5: PROC03 - Use in closed batch process (synthesis or formulation)

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Concentration of the substance in the mixture: 1 - 5%.
Physical state	: Medium volatile liquid, liquid preparations.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of one hand (240 cm ²).
Other conditions affecting workers exposure	: Outdoor use / Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 90%.
Conditions and measures related to personal protection, hygiene and health evaluation	
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Section 3 - Exposure estimation and reference to its source**Exposure estimation and reference to its source - Environment: 1: ERC04 - Industrial use of processing aids in processes and products, not becoming part of articles**

Exposure assessment (environment): : EUSES

Ethylenediamine, EDA	Exposure Scenario: 4	Use as a processing aid/additive - Industrial.
Exposure estimation	<p>: Freshwater: 0.0000119 mg/l. Risk characterisation ratio (PEC/PNEC): 0.0007.</p> <p>Freshwater sediment: 0.001 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.0007.</p> <p>Marine water: 0.00000211 mg/l. Risk characterisation ratio (PEC/PNEC): 0.0013.</p> <p>Marine water sediment: 0.002 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.0013.</p> <p>Sewage Treatment Plant: 0 mg/l. Risk characterisation ratio (PEC/PNEC): 0.</p> <p>Soil: 0.017 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.005.</p>	
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Environment: 2: ERC07 - Industrial use of substances in closed systems		
Exposure assessment (environment):	: EUSES	
Exposure estimation	<p>: Freshwater: 0.002 mg/l. Risk characterisation ratio (PEC/PNEC): 0.158.</p> <p>Freshwater sediment: 0.26 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.159.</p> <p>Marine water: 0.0002 mg/l. Risk characterisation ratio (PEC/PNEC): 0.158.</p> <p>Marine water sediment: 0.026 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.159.</p> <p>Sewage Treatment Plant: 0.024 mg/l. Risk characterisation ratio (PEC/PNEC): 0.05.</p> <p>Soil: 0.008 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.002.</p>	
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 3: PROC01 - Use in closed process, no likelihood of exposure		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	<p>: Worker - dermal, long-term - systemic: 0.0068 mg/kg bw/day. Risk characterisation ratio: 0.0019.</p> <p>Worker - inhalative, long-term - systemic: 0.005 mg/m³. Risk characterisation ratio: 0.0002.</p> <p>Worker - combined, long-term - systemic: 0.0021.</p>	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 4: PROC02 - Use in closed, continuous process with occasional controlled exposure

Exposure assessment (human): : ECETOC TRA v2.0 worker; modified version

Exposure estimation : **Worker - dermal, long-term - systemic:** 0.027 mg/kg bw/day.
Risk characterisation ratio: 0.008.

Worker - inhalative, long-term - systemic: 5.012 mg/m³.
Risk characterisation ratio: 0.200.

Worker - combined, long-term - systemic: 0.208.

Remark : Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 5: PROC03 - Use in closed batch process (synthesis or formulation)

Exposure assessment (human): : ECETOC TRA v2.0 worker; modified version

Exposure estimation : **Worker - dermal, long-term - systemic:** 0.0007 mg/kg bw/day.
Risk characterisation ratio: 0.0002.

Worker - inhalative, long-term - systemic: 1.253 mg/m³.
Risk characterisation ratio: 0.0501.

Worker - combined, long-term - systemic: 0.0503.

Remark : Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Section 4 - Guidance to DU to evaluate whether he works inside the boundaries set by the ES

General : The immediate downstream user is required to evaluate whether the operational conditions and risk management measures described in the exposure scenario fit to his use. If other OC/RMM are adopted, the user has to ensure that risks are managed to at least equivalent levels. The risk assessment methods/tools given in section 3 may be used for this evaluation.

Environment : Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Annex to the extended Safety Data Sheet (eSDS)

Professional

Identification of the substance or mixture

Product definition : Mono-constituent substance
Product name : Ethylenediamine, EDA

Section 1 - Title

Short title of the exposure scenario : Use as a processing aid/additive - Professional.
List of use descriptors : **Identified use name: ES05:** Use as a processing aid/additive - Professional: SU22; PROC20; ERC09a, ERC09b
Process Category: PROC20
Substance supplied to that use in form of: In a mixture
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC09a, ERC09b
Environmental contributing scenarios : **ERC09a - Wide dispersive indoor use of substances in closed systems**
ERC09b - Wide dispersive outdoor use of substances in closed systems
Health Contributing scenarios : **PROC20 - Heat and pressure transfer fluids in dispersive, professional use but closed systems**

Number of the ES	: 5
-------------------------	-----

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: ERC09a - Wide dispersive indoor use of substances in closed systems

Amounts used : Amounts used: 22100 tonnes/year.
 Fraction used at main source: 0.2%.
 Regional use tonnage: 10%.
Frequency and duration of use : 365 days.
Environment factors not influenced by risk management : River flow rate: 18000 m³/d.
Other conditions affecting environmental exposure : Release to air from process: 5%.
 Release to waste water from process: 0%.
 Release to soil from process: 0%.
Organisational measures to prevent/limit release from site : Do not allow to enter drains or watercourses. Do not allow contact with soil, surface or groundwater.
Conditions and measures related to sewage treatment plant : Discharge rate: 2000 m³/d.

Contributing scenario controlling environmental exposure for 2: ERC09b - Wide dispersive outdoor use of substances in closed systems

Amounts used : Amounts used: 22100 tonnes/year.
 Fraction used at main source: 0.2%.
 Regional use tonnage: 10%.
Frequency and duration of use : 365 days.
Environment factors not influenced by risk management : River flow rate: 18000 m³/d.
Other conditions affecting environmental exposure : Release to air from process: 5%.
 Release to waste water from process: 5%.
 Release to soil from process: 5%.

Ethylenediamine, EDA	Exposure Scenario: 5	Use as a processing aid/additive - Professional.
Organisational measures to prevent/limit release from site	: Do not allow to enter drains or watercourses. Do not allow contact with soil, surface or groundwater.	
Conditions and measures related to sewage treatment plant	: Discharge rate: 2000 m ³ /d.	
Contributing scenario controlling worker exposure for 3: PROC20 - Heat and pressure transfer fluids in dispersive, professional use but closed systems		
Product characteristics	: Vapour pressure: 1300 Pa.	
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 5%.	
Physical state	: Medium volatile liquid, liquid preparations.	
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.	
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).	
Other conditions affecting workers exposure	: Outdoor use / Indoor use.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.	
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves.	

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: ERC09a - Wide dispersive indoor use of substances in closed systems	
Exposure assessment (environment):	: EUSES
Exposure estimation	: Freshwater: 0.00327 mg/l. Risk characterisation ratio (PEC/PNEC): 0.20. Freshwater sediment: 0.34 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.20. Marine water: 0.000327 mg/l. Risk characterisation ratio (PEC/PNEC): 0.20. Marine water sediment: 0.034 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.20. Sewage Treatment Plant: 0.029 mg/l. Risk characterisation ratio (PEC/PNEC): 0.058. Soil: 0.016 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.005.
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Environment: 2: ERC09b - Wide dispersive outdoor use of substances in closed systems

Exposure assessment (environment): : EUSES

Exposure estimation : Freshwater: 0.00327 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.20.

Freshwater sediment: 0.34 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.20.

Marine water: 0.000327 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.20.

Marine water sediment: 0.034 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.20.

Sewage Treatment Plant: 0.029 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.058.

Soil: 0.016 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.005.

Remark : Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 3: PROC20 - Heat and pressure transfer fluids in dispersive, professional use but closed systems

Exposure assessment (human): : ECETOC TRA v2.0 worker; modified version

Exposure estimation : **Worker - dermal, long-term - systemic:** 0.086 mg/kg bw/day.
Risk characterisation ratio: 0.024.

Worker - inhalative, long-term - systemic: 2.506 mg/m³.
Risk characterisation ratio: 0.100.

Worker - combined, long-term - systemic: 0.124.

Remark : Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Section 4 - Guidance to DU to evaluate whether he works inside the boundaries set by the ES

General	: The immediate downstream user is required to evaluate whether the operational conditions and risk management measures described in the exposure scenario fit to his use. If other OC/RMM are adopted, the user has to ensure that risks are managed to at least equivalent levels. The risk assessment methods/tools given in section 3 may be used for this evaluation.
Environment	: Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Mono-constituent substance
Product name : Ethylenediamine, EDA

Section 1 - Title

Short title of the exposure scenario : Monomer use in epoxy, PU, adhesives, coatings and other polymers - Industrial.

List of use descriptors : **Identified use name: ES06:** Monomer use in epoxy, PU, adhesives, coatings and other polymers - Industrial: SU03; PROC05, PROC07, PROC08a, PROC10, PROC13, PROC14, PROC19, PROC24; ERC05, ERC06a, ERC06b, ERC06c, ERC06d
Process Category: PROC05, PROC07, PROC08a, PROC10, PROC13, PROC14, PROC19, PROC24
Substance supplied to that use in form of: In a mixture
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC05, ERC06a, ERC06b, ERC06c, ERC06d

Environmental contributing scenarios : **All ERCs (see above)**

Health Contributing scenarios : **PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)**
PROC07 - Spraying in industrial settings and applications
PROC08a - Transfer of substance or preparation (charging/discharging) from/ to vessels/large containers at non-dedicated facilities
PROC10 - Roller application or brushing
PROC13 - Treatment of articles by dipping and pouring
PROC14 - Production of preparations or articles by tableting, compression, extrusion, pelletisation
PROC19 - Hand-mixing with intimate contact and only PPE available
PROC24 - High (mechanical) energy work-up of substances bound in materials and/or articles

Number of the ES	: 6
-------------------------	-----

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: All ERCs (see above)

Amounts used : Amounts used: 4000 tonnes/year.
 Fraction used at main source: 10%.
 Regional use tonnage: 100%.

Frequency and duration of use : 220 days.

Environment factors not influenced by risk management : River flow rate: 18000 m³/d.

Other conditions affecting environmental exposure : Release to air from process: 0.017%.
 Release to waste water from process: 0%.
 Release to soil from process: 0%.
 FEICA SPERC 5.1b.v1.

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Waste water treatment: Sewage Treatment Plant.

Organisational measures to prevent/limit release from site : Do not allow to enter drains or watercourses. Do not allow contact with soil, surface or groundwater.

Ethylenediamine, EDA	Exposure Scenario: 6	Monomer use in epoxy, PU, adhesives, coatings and other polymers - Industrial.
-----------------------------	----------------------	---

Conditions and measures related to sewage treatment plant	: Discharge rate: 2000 m ³ /d.
--	---

Contributing scenario controlling worker exposure for 2: PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 5%.
Physical state	: Medium volatile liquid, liquid preparations.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	: Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 90%.

Conditions and measures related to personal protection, hygiene and health evaluation

Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 3: PROC07 - Spraying in industrial settings and applications

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 5%.
Physical state	: Medium volatile liquid, liquid preparations.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Hands and forearms (1500 cm ²).
Other conditions affecting workers exposure	: Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 95%.

Conditions and measures related to personal protection, hygiene and health evaluation

Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 4: PROC08a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics : Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article : Covers percentage substance in the product up to 5%.
Physical state : Medium volatile liquid, liquid preparations.
Frequency and duration of use/exposure : Exposure duration per day: > 4 hours.
Frequency: ≤ 240 days per year.
Human factors not influenced by risk management : Exposed skin surface assumed: Palm of both hands (480 cm²).

Other conditions affecting workers exposure : Indoor use.

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation - efficiency of at least 90%.

Conditions and measures related to personal protection, hygiene and health evaluation

Advice on general occupational hygiene : Ensure good industrial hygiene. Wash hands before breaks and after work.

Personal protection : Use suitable eye protection.
Wear suitable protective clothing.
Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 5: PROC10 - Roller application or brushing

Product characteristics : Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article : Covers percentage substance in the product up to 5%.
Physical state : Medium volatile liquid, liquid preparations.
Frequency and duration of use/exposure : Exposure duration per day: > 4 hours.
Frequency: ≤ 240 days per year.
Human factors not influenced by risk management : Exposed skin surface assumed: Both hands (960 cm²).

Other conditions affecting workers exposure : Indoor use.

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation - efficiency of at least 90%.

Conditions and measures related to personal protection, hygiene and health evaluation

Advice on general occupational hygiene : Ensure good industrial hygiene. Wash hands before breaks and after work.

Personal protection : Use suitable eye protection.
Wear suitable protective clothing.
Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 6: PROC13 - Treatment of articles by dipping and pouring

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 5%.
Physical state	: Medium volatile liquid, liquid preparations.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	: Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 90%.
Conditions and measures related to personal protection, hygiene and health evaluation	
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).

Contributing scenario controlling worker exposure for 7: PROC14 - Production of preparations or articles by tableting, compression, extrusion, pelletisation

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 5%.
Physical state	: Medium volatile liquid.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	: Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 90%.
Conditions and measures related to personal protection, hygiene and health evaluation	
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves tested to EN374. (Efficiency of at least 80%).

Contributing scenario controlling worker exposure for 8: PROC19 - Hand-mixing with intimate contact and only PPE available

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 5%.
Physical state	: Medium volatile liquid, liquid preparations.
Frequency and duration of use/exposure	: Exposure duration per day: < 1 hour. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Hands and forearms (1500 cm ²).
Other conditions affecting workers exposure	: Indoor use.
Conditions and measures related to personal protection, hygiene and health evaluation	
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).
Respiratory protection	: Wear respiratory protection. (Efficiency of at least 90%).

Contributing scenario controlling worker exposure for 9: PROC24 - High (mechanical) energy work-up of substances bound in materials and/or articles

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 1%.
Physical state	: Solid, medium dustiness.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Hands and forearms (1980 cm ²).
Other conditions affecting workers exposure	: Indoor use.
Conditions and measures related to personal protection, hygiene and health evaluation	
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves.

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: All ERCs (see above)

Exposure assessment (environment):	: EUSES
Exposure estimation	: Freshwater: 0.0000146 mg/l. Risk characterisation ratio (PEC/PNEC): 0.000913.
	: Freshwater sediment: 0.00152 mg/kg ww. Risk characterisation ratio (PEC/PNEC): 0.000910.
	: Marine water: 0.00000260 mg/l. Risk characterisation ratio (PEC/PNEC): 0.00163.
	: Marine water sediment: 0.000271 mg/kg ww.

Ethylenediamine, EDA	Exposure Scenario: 6	Monomer use in epoxy, PU, adhesives, coatings and other polymers - Industrial.
	<p>Risk characterisation ratio (PEC/PNEC): 0.00162.</p> <p>Sewage Treatment Plant: 0 mg/l. Risk characterisation ratio (PEC/PNEC): 0.</p> <p>Soil: 0.021 mg/kg wwt. Risk characterisation ratio (PEC/PNEC): 0.006.</p>	
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 2: PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.00007 mg/kg bw/day. Risk characterisation ratio: 0.00002.	
	: Worker - inhalative, long-term - systemic: 0.626 mg/m ³ . Risk characterisation ratio: 0.025.	
	: Worker - combined, long-term - systemic: 0.025.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 3: PROC07 - Spraying in industrial settings and applications		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.002 mg/kg bw/day. Risk characterisation ratio: 0.0006.	
	: Worker - inhalative, long-term - systemic: 1.566 mg/m ³ . Risk characterisation ratio: 0.063.	
	: Worker - combined, long-term - systemic: 0.063.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 4: PROC08a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.00014 mg/kg bw/day. Risk characterisation ratio: 0.00004.	
	: Worker - inhalative, long-term - systemic: 0.626 mg/m ³ . Risk characterisation ratio: 0.025.	
	: Worker - combined, long-term - systemic: 0.025.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Ethylenediamine, EDA	Exposure Scenario: 6	Monomer use in epoxy, PU, adhesives, coatings and other polymers - Industrial.
Exposure estimation and reference to its source - Workers: 5: PROC10 - Roller application or brushing		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.0007 mg/kg bw/day. Risk characterisation ratio: 0.00019.	
	: Worker - inhalative, long-term - systemic: 0.626 mg/m ³ . Risk characterisation ratio: 0.025.	
	: Worker - combined, long-term - systemic: 0.025.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 6: PROC13 - Treatment of articles by dipping and pouring		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.0014 mg/kg bw/day. Risk characterisation ratio: 0.0004.	
	: Worker - inhalative, long-term - systemic: 0.626 mg/m ³ . Risk characterisation ratio: 0.025.	
	: Worker - combined, long-term - systemic: 0.025.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 7: PROC14 - Production of preparations or articles by tableting, compression, extrusion, pelletisation		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.003 mg/kg bw/day. Risk characterisation ratio: 0.0009.	
	: Worker - inhalative, long-term - systemic: 0.626 mg/m ³ . Risk characterisation ratio: 0.025.	
	: Worker - combined, long-term - systemic: 0.025.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 8: PROC19 - Hand-mixing with intimate contact and only PPE available		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.14 mg/kg bw/day. Risk characterisation ratio: 0.039.	
	: Worker - inhalative, long-term - systemic: 0.125 mg/m ³ . Risk characterisation ratio: 0.005.	
	: Worker - combined, long-term - systemic: 0.044.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 9: PROC24 - High (mechanical) energy work-up of substances bound in materials and/or articles

Exposure assessment (human): : ECETOC TRA v2.0 worker; modified version

Exposure estimation : **Worker - dermal, long-term - systemic:** 0.028 mg/kg bw/day.
Risk characterisation ratio: 0.0078.

Worker - inhalative, long-term - systemic: 0.1 mg/m³.
Risk characterisation ratio: 0.004.

Worker - combined, long-term - systemic: 0.012.

Remark : Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Section 4 - Guidance to DU to evaluate whether he works inside the boundaries set by the ES

General : The immediate downstream user is required to evaluate whether the operational conditions and risk management measures described in the exposure scenario fit to his use. If other OC/RMM are adopted, the user has to ensure that risks are managed to at least equivalent levels. The risk assessment methods/tools given in section 3 may be used for this evaluation.

Environment : Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Annex to the extended Safety Data Sheet (eSDS)

Professional

Identification of the substance or mixture

Product definition : Mono-constituent substance
Product name : Ethylenediamine, EDA

Section 1 - Title

Short title of the exposure scenario : Monomer use in epoxy, PU, adhesives, coatings and other polymers - Professional.

List of use descriptors : **Identified use name: ES07:** Monomer use in epoxy, PU, adhesives, coatings and other polymers - Professional: SU22; PROC05, PROC08a, PROC10, PROC11, PROC13, PROC14, PROC19, PROC24; ERC08c, ERC08f
Process Category: PROC05, PROC08a, PROC10, PROC11, PROC13, PROC14, PROC19, PROC24
Substance supplied to that use in form of: In a mixture
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC08c, ERC08f

Environmental contributing scenarios : **ERC08c - Wide dispersive indoor use resulting in inclusion into or onto a matrix**
ERC08f - Wide dispersive outdoor use resulting in inclusion into or onto a matrix

Health Contributing scenarios : **PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)**
PROC08a - Transfer of substance or preparation (charging/discharging) from/ to vessels/large containers at non-dedicated facilities
PROC10 - Roller application or brushing
PROC11 - Spraying outside industrial settings and/or applications
PROC13 - Treatment of articles by dipping and pouring
PROC14 - Production of preparations or articles by tableting, compression, extrusion, pelletisation
PROC19 - Hand-mixing with intimate contact and only PPE available
PROC24 - High (mechanical) energy work-up of substances bound in materials and/or articles

Number of the ES	: 7
-------------------------	-----

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: ERC08c - Wide dispersive indoor use resulting in inclusion into or onto a matrix

Amounts used : Amounts used: 4000 tonnes/year.
 Fraction used at main source: 0.2%.
 Regional use tonnage: 10%.

Frequency and duration of use : 365 days.

Environment factors not influenced by risk management : River flow rate: 18000 m³/d.

Other conditions affecting environmental exposure : Release to air from process: 0%.
 Release to waste water from process: 1.5%.
 Release to soil from process: 0%.
 FEICA SPERC 8c.1a.v1.

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Waste water treatment: Sewage Treatment Plant.

Ethylenediamine, EDA	Exposure Scenario: 7	Monomer use in epoxy, PU, adhesives, coatings and other polymers - Professional.
-----------------------------	----------------------	---

Organisational measures to prevent/limit release from site	: Do not allow to enter drains or watercourses. Do not allow contact with soil, surface or groundwater.
Conditions and measures related to sewage treatment plant	: Discharge rate: 2000 m ³ /d.

Contributing scenario controlling environmental exposure for 2: ERC08f - Wide dispersive outdoor use resulting in inclusion into or onto a matrix	
Amounts used	: Amounts used: 4000 tonnes/year. Fraction used at main source: 0.2%. Regional use tonnage: 10%.
Frequency and duration of use	: 365 days.
Environment factors not influenced by risk management	: River flow rate: 18000 m ³ /d.
Other conditions affecting environmental exposure	: Release to air from process: 0%. Release to waste water from process: 1.5%. Release to soil from process: 0%. FEICA SPERC 8c.1a.v1.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil	: Waste water treatment: Sewage Treatment Plant.
Organisational measures to prevent/limit release from site	: Do not allow to enter drains or watercourses. Do not allow contact with soil, surface or groundwater.
Conditions and measures related to sewage treatment plant	: Discharge rate: 2000 m ³ /d.

Contributing scenario controlling worker exposure for 3: PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	
Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 5%.
Physical state	: Medium volatile liquid, liquid preparations.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	: Outdoor use / Indoor use. Open surface: < 0.1 m ² (ART). Room size: Assumes large workrooms. (ART)
Technical conditions and measures at process level (source) to prevent release	: Location: Indoor (ART). Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces (ART).
Technical conditions and measures to control dispersion from source towards the worker	: Mechanical ventilation giving at least 3 ach (air changes per hour) (ART).
Conditions and measures related to personal protection, hygiene and health evaluation	
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.

Ethylenediamine, EDA	Exposure Scenario: 7	Monomer use in epoxy, PU, adhesives, coatings and other polymers - Professional.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves tested to EN374. (Efficiency of at least 80%).	
Contributing scenario controlling worker exposure for 4: PROC08a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
Product characteristics	: Vapour pressure: 1300 Pa.	
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 5%.	
Physical state	: Medium volatile liquid, liquid preparations.	
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.	
Human factors not influenced by risk management	: Exposed skin surface assumed: Both hands (960 cm ²).	
Other conditions affecting workers exposure	: Outdoor use / Indoor use. Open surface: < 0.1 m ² (ART). Room size: Assumes large workrooms. (ART) Splash loading (ART).	
Technical conditions and measures at process level (source) to prevent release	: Location: Indoor (ART). Containment: Open process (ART). Transfer of liquid products - falling liquids (ART). Transferring 10 - 100 L/min.	
Technical conditions and measures to control dispersion from source towards the worker	: Mechanical ventilation giving at least 3 ach (air changes per hour) (ART).	
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.	
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves tested to EN374. (Efficiency of at least 80%).	
Contributing scenario controlling worker exposure for 5: PROC10 - Roller application or brushing		
Product characteristics	: Vapour pressure: 1300 Pa.	
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 1%.	
Physical state	: Medium volatile liquid, liquid preparations.	
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.	
Human factors not influenced by risk management	: Exposed skin surface assumed: Both hands (960 cm ²).	
Other conditions affecting workers exposure	: Outdoor use / Indoor use.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.	
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves tested to EN374. (Efficiency of at least 80%).	

Contributing scenario controlling worker exposure for 6: PROC11 - Spraying outside industrial settings and/or applications

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 1%.
Physical state	: Medium volatile liquid, liquid preparations.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	: Outdoor use / Indoor use.

Conditions and measures related to personal protection, hygiene and health evaluation

Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves tested to EN374. (Efficiency of at least 80%).
Respiratory protection	: Wear respiratory protection. (Efficiency of at least 90%).

Contributing scenario controlling worker exposure for 7: PROC13 - Treatment of articles by dipping and pouring

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 5%.
Physical state	: Medium volatile liquid, liquid preparations.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).
Other conditions affecting workers exposure	: Indoor use.

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation - efficiency of at least 80%.

Conditions and measures related to personal protection, hygiene and health evaluation

Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves tested to EN374. (Efficiency of at least 80%).

Contributing scenario controlling worker exposure for 8: PROC14 - Production of preparations or articles by tableting, compression, extrusion, pelletisation

Product characteristics	: Vapour pressure: 1300 Pa.
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 5%.
Physical state	: Medium volatile liquid.
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.
Human factors not influenced by risk management	: Exposed skin surface assumed: Palm of both hands (480 cm ²).

Ethylenediamine, EDA	Exposure Scenario: 7	Monomer use in epoxy, PU, adhesives, coatings and other polymers - Professional.
Other conditions affecting workers exposure	: Indoor use.	
Technical conditions and measures to control dispersion from source towards the worker	: Local exhaust ventilation - efficiency of at least 80%.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.	
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves tested to EN374. (Efficiency of at least 80%).	
Contributing scenario controlling worker exposure for 9: PROC19 - Hand-mixing with intimate contact and only PPE available		
Product characteristics	: Vapour pressure: 1300 Pa.	
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 5%.	
Physical state	: Medium volatile liquid, liquid preparations.	
Frequency and duration of use/exposure	: Exposure duration per day: < 1 hour. Frequency: ≤ 240 days per year.	
Human factors not influenced by risk management	: Exposed skin surface assumed: Hands and forearms (1500 cm ²).	
Other conditions affecting workers exposure	: Indoor use.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.	
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear chemical-resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Efficiency of at least 98%).	
Respiratory protection	: Wear respiratory protection. (Efficiency of at least 90%).	
Contributing scenario controlling worker exposure for 10: PROC24 - High (mechanical) energy work-up of substances bound in materials and/or articles		
Product characteristics	: Vapour pressure: 1300 Pa.	
Concentration of substance in mixture or article	: Covers percentage substance in the product up to 1%.	
Physical state	: Solid, medium dustiness.	
Frequency and duration of use/exposure	: Exposure duration per day: > 4 hours. Frequency: ≤ 240 days per year.	
Human factors not influenced by risk management	: Exposed skin surface assumed: Hands and forearms (1980 cm ²).	
Other conditions affecting workers exposure	: Indoor use.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Advice on general occupational hygiene	: Ensure good industrial hygiene. Wash hands before breaks and after work.	
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves.	

Section 3 - Exposure estimation and reference to its source**Exposure estimation and reference to its source - Environment: 1: ERC08c - Wide dispersive indoor use resulting in inclusion into or onto a matrix**

Exposure assessment (environment): : EUSES

Exposure estimation : Freshwater: 0.00175 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.11.

Freshwater sediment: 0.18 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.11.

Marine water: 0.000174 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.11.

Marine water sediment: 0.018 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.11.

Sewage Treatment Plant: 0.016 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.032.

Soil: 0.0000149 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.00000443.

Remark : Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Environment: 2: ERC08f - Wide dispersive outdoor use resulting in inclusion into or onto a matrix

Exposure assessment (environment): : EUSES

Exposure estimation : Freshwater: 0.00175 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.11.

Freshwater sediment: 0.18 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.11.

Marine water: 0.000174 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.11.

Marine water sediment: 0.018 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.11.

Sewage Treatment Plant: 0.016 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.032.

Soil: 0.0000149 mg/kg wwt.
Risk characterisation ratio (PEC/PNEC): 0.00000443.

Remark : Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 3: PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

Exposure assessment (human): : Dermal: ECETOC TRA v2.0 worker; modified version.
Inhalation: ART v1.0, 75th percentile 8 hour TWA.

Ethylenediamine, EDA	Exposure Scenario: 7	Monomer use in epoxy, PU, adhesives, coatings and other polymers - Professional.
Exposure estimation	<p><i>Outdoor</i> Worker - dermal, long-term - systemic: 0.137 mg/kg bw/day. Risk characterisation ratio: 0.038.</p> <p>Worker - inhalative, long-term - systemic: 0.690 mg/m³. Risk characterisation ratio: 0.028.</p> <p>Worker - combined, long-term - systemic: 0.066.</p> <p><i>Indoor</i> Worker - dermal, long-term - systemic: 0.137 mg/kg bw/day. Risk characterisation ratio: 0.038.</p> <p>Worker - inhalative, long-term - systemic: 1.9 mg/m³. Risk characterisation ratio: 0.076.</p> <p>Worker - combined, long-term - systemic: 0.114.</p>	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 4: PROC08a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
Exposure assessment (human):	: Dermal: ECETOC TRA v2.0 worker; modified version. Inhalation: ECETOC TRA v2.0 worker; modified version, ART v1.0, 75th percentile 8 hour TWA.	
Exposure estimation	<p><i>Outdoor</i> Worker - dermal, long-term - systemic: 0.137 mg/kg bw/day. Risk characterisation ratio: 0.038.</p> <p>Worker - inhalative, long-term - systemic: 2.1 mg/m³. (ART) Risk characterisation ratio: 0.084.</p> <p>Worker - combined, long-term - systemic: 0.122.</p> <p><i>Indoor</i> Worker - dermal, long-term - systemic: 0.137 mg/kg bw/day. Risk characterisation ratio: 0.038.</p> <p>Worker - inhalative, long-term - systemic: 5.8 mg/m³. Risk characterisation ratio: 0.232.</p> <p>Worker - combined, long-term - systemic: 0.270.</p>	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 5: PROC10 - Roller application or brushing		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version.	
Exposure estimation	<p><i>Outdoor</i> Worker - dermal, long-term - systemic: 0.054 mg/kg bw/day. Risk characterisation ratio: 0.015.</p> <p>Worker - inhalative, long-term - systemic: 1.754 mg/m³. Risk characterisation ratio: 0.07.</p> <p>Worker - combined, long-term - systemic: 0.085.</p> <p><i>Indoor</i> Worker - dermal, long-term - systemic: 0.054 mg/kg bw/day. Risk characterisation ratio: 0.015.</p> <p>Worker - inhalative, long-term - systemic: 2.506 mg/m³. Risk characterisation ratio: 0.10.</p>	
Date of issue/Date of revision	: 04/10/2017	Version : 10 / en 58/60

Ethylenediamine, EDA	Exposure Scenario: 7	Monomer use in epoxy, PU, adhesives, coatings and other polymers - Professional.
	Worker - combined, long-term - systemic: 0.115.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 6: PROC11 - Spraying outside industrial settings and/or applications		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version.	
Exposure estimation	: <i>Outdoor</i> Worker - dermal, long-term - systemic: 0.214 mg/kg bw/day. Risk characterisation ratio: 0.059.	
	Worker - inhalative, long-term - systemic: 0.877 mg/m³. Risk characterisation ratio: 0.035.	
	Worker - combined, long-term - systemic: 0.094.	
	<i>Indoor</i> Worker - dermal, long-term - systemic: 0.214 mg/kg bw/day. Risk characterisation ratio: 0.059.	
	Worker - inhalative, long-term - systemic: 1.253 mg/m³. Risk characterisation ratio: 0.050.	
	Worker - combined, long-term - systemic: 0.109.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 7: PROC13 - Treatment of articles by dipping and pouring		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version.	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.0068 mg/kg bw/day. Risk characterisation ratio: 0.002.	
	Worker - inhalative, long-term - systemic: 2.506 mg/m³. Risk characterisation ratio: 0.100.	
	Worker - combined, long-term - systemic: 0.102.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 8: PROC14 - Production of preparations or articles by tableting, compression, extrusion, pelletisation		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version.	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.0034 mg/kg bw/day. Risk characterisation ratio: 0.0009.	
	Worker - inhalative, long-term - systemic: 2.506 mg/m³. Risk characterisation ratio: 0.100.	
	Worker - combined, long-term - systemic: 0.100.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Ethylenediamine, EDA	Exposure Scenario: 7	Monomer use in epoxy, PU, adhesives, coatings and other polymers - Professional.
Exposure estimation and reference to its source - Workers: 9: PROC19 - Hand-mixing with intimate contact and only PPE available		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version.	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.14 mg/kg bw/day. Risk characterisation ratio: 0.039.	
	: Worker - inhalative, long-term - systemic: 0.2506 mg/m ³ . Risk characterisation ratio: 0.0100.	
	: Worker - combined, long-term - systemic: 0.049.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 10: PROC24 - High (mechanical) energy work-up of substances bound in materials and/or articles		
Exposure assessment (human):	: ECETOC TRA v2.0 worker; modified version.	
Exposure estimation	: Worker - dermal, long-term - systemic: 0.028 mg/kg bw/day. Risk characterisation ratio: 0.008.	
	: Worker - inhalative, long-term - systemic: 0.2 mg/m ³ . Risk characterisation ratio: 0.008.	
	: Worker - combined, long-term - systemic: 0.016.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Section 4 - Guidance to DU to evaluate whether he works inside the boundaries set by the ES

General	: The immediate downstream user is required to evaluate whether the operational conditions and risk management measures described in the exposure scenario fit to his use. If other OC/RMM are adopted, the user has to ensure that risks are managed to at least equivalent levels. The risk assessment methods/tools given in section 3 may be used for this evaluation.
Environment	: Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.