

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
ES 01: Manufacture - Industrial: PROC01, PROC02, PROC08a, PROC08b, PROC15; ERC01
ES 02: Use at industrial sites; Use as an intermediate (medium scale) - Industrial: PC19; PROC01, PROC02, PROC03, PROC04, PROC15; ERC06a
ES 03: Use at industrial sites; Use as an intermediate (large scale) - Industrial: PC19; PROC01, PROC02, PROC03, PROC04, PROC15; ERC06a
ES 04: Formulation - Industrial: PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02
ES 05: Use at industrial sites; Use as a processing aid/additive. Use in closed process - Industrial: PROC01, PROC02, PROC03; ERC07
ES 06: Use at industrial sites; Use as a scavenging agent in refinery streams - Industrial: PROC01, PROC02, PROC03; ERC04
ES 07: Widespread use by professional workers; Use as a processing aid/additive - Professional: PROC20; ERC09a, ERC09b
ES 08: Use at industrial sites; Industrial use of polymer - residual monomer - Industrial: PROC05, PROC07, PROC08a, PROC10, PROC13, PROC14, PROC19, PROC24; ERC05, ERC06a, ERC06b, ERC06c, ERC06d
ES 09: Widespread use by professional workers; Monomer use in epoxy, PU, adhesives, coatings and other polymers - Professional: 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.

Stationsplein 121

3818LE Amersfoort

The 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** : +31 352 323 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.

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SECTION 2: Hazards identification

2.3 Other hazards

Product meets the criteria for PBT or vPvB according to Regulation (EC) No. 1907/2006, Annex XIII

PBT	P	B	T	vPvB	vP	vB
No	No	No	No	No	No	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.

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.

SECTION 4: First aid measures

- 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.

5.2 Special hazards arising from the substance or mixture

SECTION 5: Firefighting measures

- Hazards from the substance or mixture** : Flammable liquid and vapour. Runoff to sewer may create fire or explosion hazard. 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. 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.

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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. See Section 10 for incompatible materials before handling or use.

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.

- 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

SECTION 8: Exposure controls/personal protection

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	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	0.275 mg/kg bw/day	General population	Systemic
	DNEL	Long term Inhalation	12.5 mg/m ³	General population	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
	Fresh water sediment	7.68 mg/kg dwt	-
	Marine water sediment	0.768 mg/kg dwt	-
	Soil	4.36 mg/kg dwt	-
	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

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

SECTION 8: Exposure controls/personal 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** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.
- 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)
- 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/cm³ [20°C]
- Solubility(ies)** : Not available.
- Solubility in water** : 1000 g/l
- Partition coefficient: n-octanol/water** : -2 to -1.3

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SECTION 9: Physical and chemical properties

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.**Acute toxicity estimates**

Product/ingredient name	Oral (mg/kg)	Dermal (mg/kg)	Inhalation (gases) (ppm)	Inhalation (vapours) (mg/l)	Inhalation (dusts and mists) (mg/l)
ethylenediamine	866	560	N/A	14.7	N/A

Irritation/Corrosion

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

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SECTION 11: Toxicological information**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 vitro Subject: Bacteria	Positive	-
	-	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.**Skin contact** : Causes severe burns. Toxic in contact with skin. May cause an allergic skin reaction.**Ingestion** : Harmful if swallowed.

SECTION 11: Toxicological information

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)
	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	-

- 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

Product/ingredient name	PBT	P	B	T	vPvB	vP	vB
ethylenediamine	No	No	No	No	No	No	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**

SECTION 13: Disposal considerations

- 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 allocation of waste identity numbers/waste descriptions must be carried out according to the EWC, specific to the industry and process.
- Packaging** : The classification of the product may meet the criteria for a hazardous waste.
- Methods of disposal** : The generation of waste should be avoided or minimised wherever possible.
- 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

- ADR/RID** : **Hazard identification number** 83
Limited quantity 1 L
Tunnel code (D/E)
- ADN** : The product is only regulated as an environmentally hazardous substance when transported in tank vessels.
- IMDG** : **Emergency schedules** F-E, S-C
- IATA** : **Quantity limitation** Passenger and Cargo Aircraft: 1 L. Packaging instructions: 851. Cargo Aircraft Only: 30 L. Packaging instructions: 855. Limited Quantities - Passenger Aircraft: 0.5 L. Packaging 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**
- Proper shipping name** : Ethylenediamine
- Ship type** : 2
- Pollution category** : 3

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

Ingredient name	Intrinsic property	Status	Reference number	Date of revision
Ethylenediamine	Substance of equivalent concern for human health	Candidate	ED 61/2018	27/06/2018

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

Other EU regulations

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

5c: 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.

Inventory list

Australia inventory (AICS) : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : **Japan inventory (ENCS):**
This material is listed or exempted.

Japan inventory (ISHL):

SECTION 15: Regulatory information

	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.
Viet Nam	: 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 :

- ADN = European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway
- ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road
- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- 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
- EWC = European Waste Catalogue
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
- N/A = Not available
- PBT = Persistent, Bioaccumulative and Toxic
- PNEC = Predicted No Effect Concentration
- RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail
- RRN = REACH Registration Number
- SGG = Segregation Group
- 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

Ethylenediamine, EDA

SECTION 16: Other information

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]

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

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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.

List of use descriptors : **Identified use name: ES 01:** Manufacture - Industrial: PROC01, PROC02, PROC08a, PROC08b, PROC15; ERC01
Process Category: PROC01, PROC02, PROC08a, PROC08b, PROC15
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC01

Environmental contributing scenarios : **Manufacture of the substance - ERC01**

Health Contributing scenarios : **Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - PROC01**
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC02
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - PROC08a
Transfer of substance or mixture (charging and discharging) at dedicated facilities - PROC08b
Use as laboratory reagent - PROC15

Number of the ES	: 01
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Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Manufacture of the substance

Product characteristics	: Liquid.
Amounts used	: Annual site tonnage: ≤50220 tonnes/year. Fraction of EU tonnage used in region: 50 %. Daily amount per site: ≤137 tonnes/day. Percentage of EU tonnage used at regional scale: 100 %.
Frequency and duration of use	: Emission days: 365 days per year.
Other conditions affecting environmental exposure	: Receiving surface water flow ≥18000 m ³ /d. Release factor after on-site risk management: water: 0.002 % (Estimated release factor). Local release rate: 2.74 kg/day. air: 0.1 % (Estimated release factor). Local release rate: 137 kg/day. Soil: 0 % (Estimated release factor).
Conditions and measures related to sewage treatment plant	: Sewage Treatment Plant: Yes. (Efficiency of at least 90.4 %) Waste water treatment: Ion exchange or Incineration. (Efficiency of at least 99 %) Assumed domestic sewage treatment plant flow 2000 m ³ /d. Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal	: Particular considerations on the waste treatment operations: No. (low risk) Waste disposal according to national/local legislation is sufficient

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics : Liquid.
Concentration of substance in mixture or article : Covers concentrations up to 100 %.

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

Personal protection : Use suitable eye protection.
 Wear suitable protective clothing.
 Wear suitable gloves.

Contributing scenario controlling worker exposure for 2: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Frequency and duration of use/exposure : Exposure duration per day: <8 hours.
Other conditions affecting workers exposure : Indoor use.
 Temperature: ≤40°C.
 Exposed skin surface assumed: 240 cm².
Technical conditions and measures at process level (source) to prevent release : Containment: Closed system.
Technical conditions and measures to control dispersion from source towards the worker : Provide a basic standard of general ventilation (1 to 3 air changes per hour).
 Occupational Health and Safety Management System: Advanced.

Contributing scenario controlling worker exposure for 3: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Frequency and duration of use/exposure : Exposure duration per day: <8 hours.
Other conditions affecting workers exposure : Outdoor use.
 Temperature: ≤40°C.
 Exposed skin surface assumed: 480 cm².
Technical conditions and measures at process level (source) to prevent release : Containment: Closed continuous process with occasional controlled exposure.
Technical conditions and measures to control dispersion from source towards the worker : Occupational Health and Safety Management System: Advanced.
Conditions and measures related to personal protection, hygiene and health evaluation
Personal protection : Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 %.

Contributing scenario controlling worker exposure for 4: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Frequency and duration of use/exposure : Exposure duration per day: <15 minutes.
Other conditions affecting workers exposure : Exposed skin surface assumed: 960 cm².
Technical conditions and measures to control dispersion from source towards the worker : Occupational Health and Safety Management System: Advanced.
Conditions and measures related to personal protection, hygiene and health evaluation
Personal protection : Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.

Contributing scenario controlling worker exposure for 5: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Frequency and duration of use/exposure : Exposure duration per day: <4 hours.

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 960 cm².

Technical conditions and measures at process level (source) to prevent release : Containment: Semi-closed process with occasional controlled exposure.

Technical conditions and measures to control dispersion from source towards the worker : Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Advanced.
Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

Personal protection : Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.

Contributing scenario controlling worker exposure for 6: Use as laboratory reagent

Frequency and duration of use/exposure : Exposure duration per day: <4 hours.

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 240 cm².

Technical conditions and measures to control dispersion from source towards the worker : Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Advanced.
Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

Personal protection : Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.

Section 3 - Exposure estimation and reference to its source**Exposure estimation and reference to its source - Environment: 1: Manufacture of the substance**

Exposure assessment (environment): : EUSES

Exposure estimation : Freshwater: 0.013 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.843.

Freshwater sediment: 6.48 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.844.

Marine water: 0.001 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.674.

Marine water sediment: 0.648 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.843.

Sewage Treatment Plant: 0.132 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.263.

Soil: 1.158 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.266.

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

Exposure estimation and reference to its source - Workers: 2: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	: Worker - inhalative, long-term - systemic: 0.025 mg/m ³ . Risk characterisation ratio: <0.01.
	Worker - dermal, long-term - systemic: 0.034 mg/cm ² . Risk characterisation ratio: <0.01.
	Worker - combined, long-term - systemic: Risk characterisation ratio: 0.01.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 3: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	: Worker - inhalative, long-term - systemic: 8.764 mg/m ³ . Risk characterisation ratio: 0.351.
	Worker - dermal, long-term - systemic: 0.137 mg/cm ² . Risk characterisation ratio: 0.038.
	Worker - combined, long-term - systemic: Risk characterisation ratio: 0.389.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 4: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	: Worker - inhalative, long-term - systemic: 0.02 mg/m ³ (measured data). Risk characterisation ratio: <0.01.
	Worker - dermal, long-term - systemic: 0.069 mg/cm ² . Risk characterisation ratio: 0.019.
	Worker - combined, long-term - systemic: Risk characterisation ratio: 0.01.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 5: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	: Worker - inhalative, long-term - systemic: 1.878 mg/m ³ . Risk characterisation ratio: 0.075.
	Worker - dermal, long-term - systemic: 0.411 mg/cm ² . Risk characterisation ratio: 0.114.
	Worker - combined, long-term - systemic: Risk characterisation ratio: 0.189.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	: Worker - inhalative, long-term - systemic: 1.502 mg/m ³ . Risk characterisation ratio: 0.06. Worker - dermal, long-term - systemic: 0.01 mg/cm ² . Risk characterisation ratio: <0.01. Worker - combined, long-term - systemic: Risk characterisation ratio: 0.063.
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 at industrial sites; Use as an intermediate (medium scale); Intermediate (PC19).

List of use descriptors : **Identified use name: ES 02:** Use at industrial sites; Use as an intermediate (medium scale) - Industrial: PC19; PROC01, PROC02, PROC03, PROC04, PROC15; ERC06a
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
Market sector by type of chemical product: PC19

Environmental contributing scenarios : **Use of intermediate** - ERC06a

Health Contributing scenarios : **All PROCs (see above)**

Number of the ES	: 02
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Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Use of intermediate

Product characteristics	: Liquid.
Amounts used	: Annual site tonnage: ≤1000 tonnes/year. Fraction of EU tonnage used in region: 1 %. Daily amount per site: ≤5 tonnes/day. Percentage of EU tonnage used at regional scale: 100 %.
Frequency and duration of use	: Emission days: 220 days per year.
Other conditions affecting environmental exposure	: Receiving surface water flow ≥18000 m ³ /d. Release factor after on-site risk management: water: 0.056 % (Estimated release factor). Local release rate: 2.8 kg/day. air: 0.1 % (Estimated release factor). Local release rate: 5 kg/day. Soil: 0 % (Estimated release factor).
Conditions and measures related to sewage treatment plant	: Sewage Treatment Plant: Yes. (Efficiency of at least 90.4 %) Waste water treatment: Ion exchange or Incineration. (Efficiency of at least 92 %) Assumed domestic sewage treatment plant flow 2000 m ³ /d. Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal	: Particular considerations on the waste treatment operations: No. (low risk) Waste disposal according to national/local legislation is sufficient

Ethylenediamine, EDA	Exposure Scenario: 02	Use at industrial sites; Use as an intermediate (medium scale); Intermediate (PC19).
Contributing scenario controlling worker exposure for: All Contributing scenarios		
Information concerning technical function: Intermediate.		
Product characteristics	: Liquid.	
Concentration of substance in mixture or article	: Covers concentrations up to 100 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves.	
Contributing scenario controlling worker exposure for 2: All PROCs (see above)		
PROC01, PROC02, PROC03, PROC04, PROC15; see ES03.		

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Use of intermediate	
Exposure assessment (environment):	: EUSES
Exposure estimation	: Freshwater: 0.014 mg/l. Risk characterisation ratio (PEC/PNEC): 0.861. Freshwater sediment: 6.617 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.862. Marine water: 0.001 mg/l. Risk characterisation ratio (PEC/PNEC): 0.689. Marine water sediment: 0.661 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.861. Sewage Treatment Plant: 0.134 mg/l. Risk characterisation ratio (PEC/PNEC): 0.269. Soil: 1.176 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.27.
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).
Exposure estimation and reference to its source - Workers: 2: All PROCs (see above)	
Exposure assessment (human):	: see ES03
Exposure estimation	:

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 at industrial sites; Use as an intermediate (large scale); Intermediate (PC19).
List of use descriptors : **Identified use name: ES 03:** Use at industrial sites; Use as an intermediate (large scale) - Industrial: PC19; PROC01, PROC02, PROC03, PROC04, PROC15; ERC06a
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
Market sector by type of chemical product: PC19

Environmental contributing scenarios : **Use of intermediate - ERC06a**

Health Contributing scenarios : **Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - PROC01**
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC02
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition - PROC03
Chemical production where opportunity for exposure arises - PROC04
Use as laboratory reagent - PROC15

Number of the ES	: 03
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Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Use of intermediate

Product characteristics	: Liquid.
Amounts used	: Annual site tonnage: ≤10040 tonnes/year. Fraction of EU tonnage used in region: 10 %. Daily amount per site: ≤25 tonnes/day. Percentage of EU tonnage used at regional scale: 100 %.
Other conditions affecting environmental exposure	: Receiving surface water flow ≥18000 m ³ /d. Release factor after on-site risk management: water: 0.01 % (Estimated release factor). Local release rate: 2.625 kg/day. air: 0.1 % (Estimated release factor). Local release rate: 25 kg/day. Soil: 0 % (Estimated release factor).
Conditions and measures related to sewage treatment plant	: Sewage Treatment Plant: Yes. (Efficiency of at least 90.4 %) Waste water treatment: Ion exchange or Incineration. (Efficiency of at least 98.5 %) Assumed domestic sewage treatment plant flow 2000 m ³ /d. Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal	: Particular considerations on the waste treatment operations: No. (low risk) Waste disposal according to national/local legislation is sufficient

Contributing scenario controlling worker exposure for: All Contributing scenarios

Information concerning technical function: Intermediate.

- Product characteristics** : Liquid.
- Concentration of substance in mixture or article** : Covers concentrations up to 100 %.

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

- Personal protection** : Use suitable eye protection.
Wear suitable protective clothing.
Wear suitable gloves.

Contributing scenario controlling worker exposure for 2: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

- Frequency and duration of use/exposure** : Exposure duration per day: <8 hours.
- Other conditions affecting workers exposure** : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 240 cm².

Technical conditions and measures at process level (source) to prevent release : Containment: Closed system.

Technical conditions and measures to control dispersion from source towards the worker : Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Advanced.

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

- Personal protection** : Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.

Contributing scenario controlling worker exposure for 3: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

- Frequency and duration of use/exposure** : Exposure duration per day: <8 hours.
- Other conditions affecting workers exposure** : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 480 cm².
- Technical conditions and measures at process level (source) to prevent release** : Containment: Closed continuous process with occasional controlled exposure.
- Technical conditions and measures to control dispersion from source towards the worker** : Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Advanced.
Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

- Personal protection** : Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.

Contributing scenario controlling worker exposure for 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

- Frequency and duration of use/exposure** : Exposure duration per day: <8 hours.
- Other conditions affecting workers exposure** : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 240 cm².
- Technical conditions and measures at process level (source) to prevent release** : Containment: Closed batch process with occasional controlled exposure.

Ethylenediamine, EDA	Exposure Scenario: 03	Use at industrial sites; Use as an intermediate (large scale); Intermediate (PC19).
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	
Contributing scenario controlling worker exposure for 5: Chemical production where opportunity for exposure arises		
Frequency and duration of use/exposure	: Exposure duration per day: <8 hours.	
Other conditions affecting workers exposure	: Indoor use. Temperature: ≤40°C. Exposed skin surface assumed: 480 cm ² .	
Technical conditions and measures at process level (source) to prevent release	: Containment: Semi-closed process with occasional controlled exposure.	
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	
Contributing scenario controlling worker exposure for 6: Use as laboratory reagent		
Frequency and duration of use/exposure	: Exposure duration per day: <4 hours.	
Other conditions affecting workers exposure	: Indoor use. Temperature: ≤40°C. Exposed skin surface assumed: 240 cm ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Use of intermediate		
Exposure assessment (environment):	: EUSES	
Exposure estimation	: Freshwater: 0.013 mg/l. Risk characterisation ratio (PEC/PNEC): 0.809.	
	Freshwater sediment: 6.217 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.81.	
	Marine water: 0.001 mg/l. Risk characterisation ratio (PEC/PNEC): 0.647.	
	Marine water sediment: 0.621 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.809.	
	Sewage Treatment Plant: 0.126 mg/l. Risk characterisation ratio (PEC/PNEC): 0.252.	
Date of issue/Date of revision	: 18/12/2019	Version : 11 / en 26/59

Ethylenediamine, EDA	Exposure Scenario: 03	Use at industrial sites; Use as an intermediate (large scale); Intermediate (PC19).
Remark	Soil: 1.104 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.253. : Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 2: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	Worker - inhalative, long-term - systemic: 0.025 mg/m ³ . Risk characterisation ratio: <0.01. Worker - dermal, long-term - systemic: 0.002 mg/cm ² . Risk characterisation ratio: <0.01. Worker - combined, long-term - systemic: Risk characterisation ratio: <0.01.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 3: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	Worker - inhalative, long-term - systemic: 1.252 mg/m ³ . Risk characterisation ratio: 0.05. Worker - dermal, long-term - systemic: 0.068 mg/cm ² . Risk characterisation ratio: 0.019. Worker - combined, long-term - systemic: Risk characterisation ratio: 0.069.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	Worker - inhalative, long-term - systemic: 2.504 mg/m ³ . Risk characterisation ratio: 0.1. Worker - dermal, long-term - systemic: 0.034 mg/cm ² . Risk characterisation ratio: <0.01. Worker - combined, long-term - systemic: Risk characterisation ratio: 0.11.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 5: Chemical production where opportunity for exposure arises		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	

Ethylenediamine, EDA	Exposure Scenario: 03	Use at industrial sites; Use as an intermediate (large scale); Intermediate (PC19).
Exposure estimation	<p>Worker - inhalative, long-term - systemic: 5.008 mg/m³. Risk characterisation ratio: 0.2.</p> <p>Worker - dermal, long-term - systemic: 0.343 mg/cm². Risk characterisation ratio: 0.095.</p> <p>Worker - combined, long-term - systemic: Risk characterisation ratio: 0.296.</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: Use as laboratory reagent		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	<p>Worker - inhalative, long-term - systemic: 1.502 mg/m³. Risk characterisation ratio: 0.06.</p> <p>Worker - dermal, long-term - systemic: 0.01 mg/cm². Risk characterisation ratio: <0.01.</p> <p>Worker - combined, long-term - systemic: Risk characterisation ratio: 0.063.</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.

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.

List of use descriptors : **Identified use name: ES 04:** Formulation - Industrial: 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 : **Formulation into mixture - ERC02**

Health Contributing scenarios : **Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition - PROC03**
Chemical production where opportunity for exposure arises - PROC04
Mixing or blending in batch processes - PROC05
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - PROC08a
Transfer of substance or mixture (charging and discharging) at dedicated facilities - PROC08b
Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC09
Use as laboratory reagent - PROC15

Number of the ES	: 04
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Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Formulation into mixture

Product characteristics	: Liquid.
Amounts used	: Annual site tonnage: ≤1400 tonnes/year. Fraction of EU tonnage used in region: 10 %. Daily amount per site: ≤6.3 tonnes/day. Percentage of EU tonnage used at regional scale: 100 %.
Frequency and duration of use	: Emission days: 220 days per year.
Other conditions affecting environmental exposure	: Receiving surface water flow ≥18000 m ³ /d. Release factor after on-site risk management: water: 0.05 % (ESVOC SPERC 2.2.v1). Local release rate: 3.15 kg/day. air: 0.025 % (ESVOC SPERC 2.2.v1). Local release rate: 1.575 kg/day. Soil: 0.01 % (ESVOC SPERC 2.2.v1).
Conditions and measures related to sewage treatment plant	: Sewage Treatment Plant: Yes. (Efficiency of at least 90.4 %) Waste water treatment: Ion exchange or Incineration. (Efficiency of at least 90 %) Assumed domestic sewage treatment plant flow 2000 m ³ /d. Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal	: Particular considerations on the waste treatment operations: No. (low risk) Waste disposal according to national/local legislation is sufficient

Contributing scenario controlling worker exposure for: All Contributing scenarios

Information concerning technical function: Corrosion inhibitor, Antiscaling agent, Absorbent/Adsorbent (gas, Liquids).

Product characteristics : Liquid.

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

Personal protection : Use suitable eye protection.
Wear suitable protective clothing.
Wear suitable gloves.

Contributing scenario controlling worker exposure for 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product characteristics : Covers concentrations up to 100 %.

Frequency and duration of use/exposure : Exposure duration per day: <8 hours.

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 240 cm².

Technical conditions and measures at process level (source) to prevent release : Containment: Closed batch process with occasional controlled exposure.

Technical conditions and measures to control dispersion from source towards the worker : Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Advanced.
Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

Personal protection : Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.

Contributing scenario controlling worker exposure for 3: Chemical production where opportunity for exposure arises

Product characteristics : Covers concentrations up to 100 %.

Frequency and duration of use/exposure : Exposure duration per day: <8 hours.

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 480 cm².

Technical conditions and measures at process level (source) to prevent release : Containment: Semi-closed process with occasional controlled exposure.

Technical conditions and measures to control dispersion from source towards the worker : Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Advanced.
Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

Personal protection : Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.

Contributing scenario controlling worker exposure for 4: Mixing or blending in batch processes

Product characteristics : Covers concentrations up to 100 %.

Frequency and duration of use/exposure : Exposure duration per day: <8 hours.

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 480 cm².
Activity/Process: Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces.
Open surface: 0.3 - 1 m².

Technical conditions and measures at process level (source) to prevent release : Containment: Closed system - Medium. Effectiveness of containment: 90 %.

Ethylenediamine, EDA	Exposure Scenario: 04	Formulation.
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 50 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	
Contributing scenario controlling worker exposure for 5: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities		
Product characteristics	: Covers concentrations up to 100 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <15 minutes.	
Other conditions affecting workers exposure	: Outdoor use. Temperature: ≤40°C. Exposed skin surface assumed: 960 cm ² . Activity/Process: Transfer of liquid products - falling liquids. Transferring: 1 - 10 L/min. Splash loading. Source located close to buildings: Yes.	
Technical conditions and measures at process level (source) to prevent release	: Containment: Closed system - Medium. Effectiveness of containment: 90 %.	
Technical conditions and measures to control dispersion from source towards the worker	: Occupational Health and Safety Management System: Advanced.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	
Contributing scenario controlling worker exposure for 6: Transfer of substance or mixture (charging and discharging) at dedicated facilities		
Product characteristics	: Covers concentrations up to 100 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <4 hours.	
Other conditions affecting workers exposure	: Indoor use. Temperature: ≤40°C. Exposed skin surface assumed: 960 cm ² .	
Technical conditions and measures at process level (source) to prevent release	: Containment: Semi-closed process with occasional controlled exposure.	
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	
Contributing scenario controlling worker exposure for 7: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)		
Product characteristics	: Covers percentage substance in the product up to 5%.	
Frequency and duration of use/exposure	: Exposure duration per day: <4 hours.	
Other conditions affecting workers exposure	: Indoor use. Temperature: ≤40°C. Exposed skin surface assumed: 480 cm ² .	
Technical conditions and measures at process level (source) to prevent release	: Containment: Semi-closed process with occasional controlled exposure.	
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Ethylenediamine, EDA	Exposure Scenario: 04	Formulation.
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	
Contributing scenario controlling worker exposure for 8: Use as laboratory reagent		
Product characteristics	: Covers concentrations up to 100 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <4 hours.	
Other conditions affecting workers exposure	: Indoor use. Temperature: ≤40°C. Exposed skin surface assumed: 240 cm ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Formulation into mixture	
Exposure assessment (environment):	: EUSES
Exposure estimation	: Freshwater: 0.015 mg/l. Risk characterisation ratio (PEC/PNEC): 0.966. Freshwater sediment: 7.418 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.966. Marine water: 0.002 mg/l. Risk characterisation ratio (PEC/PNEC): 0.772. Marine water sediment: 0.742 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.966. Sewage Treatment Plant: 0.151 mg/l. Risk characterisation ratio (PEC/PNEC): 0.302. Soil: 1.323 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.303.
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	: Worker - inhalative, long-term - systemic: 2.504 mg/m ³ . Risk characterisation ratio: 0.1. Worker - dermal, long-term - systemic: 0.034 mg/cm ² . Risk characterisation ratio: <0.01. Worker - combined, long-term - systemic: Risk characterisation ratio: 0.11.

Ethylenediamine, EDA	Exposure Scenario: 04	Formulation.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 3: Chemical production where opportunity for exposure arises		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 5.008 mg/m ³ . Risk characterisation ratio: 0.2.	
	: Worker - dermal, long-term - systemic: 0.343 mg/cm ² . Risk characterisation ratio: 0.095.	
	: Worker - combined, long-term - systemic: Risk characterisation ratio: 0.296.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 4: Mixing or blending in batch processes		
Exposure assessment (human):	: Inhalation exposure: ART v1.0 Dermal exposure: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 2.6 mg/m ³ . Risk characterisation ratio: 0.104.	
	: Worker - dermal, long-term - systemic: 0.686 mg/cm ² . Risk characterisation ratio: 0.19.	
	: Worker - combined, long-term - systemic: Risk characterisation ratio: 0.294.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 5: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities		
Exposure assessment (human):	: Inhalation exposure: ART v1.0 Dermal exposure: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 3.1 mg/m ³ . Risk characterisation ratio: 0.124.	
	: Worker - dermal, long-term - systemic: 0.069 mg/cm ² . Risk characterisation ratio: 0.019.	
	: Worker - combined, long-term - systemic: Risk characterisation ratio: 0.143.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 6: Transfer of substance or mixture (charging and discharging) at dedicated facilities		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 1.878 mg/m ³ . Risk characterisation ratio: 0.075.	
	: Worker - dermal, long-term - systemic: 0.411 mg/cm ² . Risk characterisation ratio: 0.114.	
	: Worker - combined, long-term - systemic: Risk characterisation ratio: 0.189.	
Date of issue/Date of revision	: 18/12/2019	Version : 11 / en 33/59

Ethylenediamine, EDA	Exposure Scenario: 04	Formulation.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 7: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 1.502 mg/m ³ . Risk characterisation ratio: 0.06.	
	: Worker - dermal, long-term - systemic: 0.041 mg/cm ² . Risk characterisation ratio: 0.011.	
	: Worker - combined, long-term - systemic: Risk characterisation ratio: 0.072.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 8: Use as laboratory reagent		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 1.502 mg/m ³ . Risk characterisation ratio: 0.06.	
	: Worker - dermal, long-term - systemic: 0.01 mg/cm ² . Risk characterisation ratio: <0.01.	
	: Worker - combined, long-term - systemic: Risk characterisation ratio: 0.063.	
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.

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 at industrial sites; Use as a processing aid/additive. Use in closed process.
List of use descriptors : **Identified use name: ES 05:** Use at industrial sites; Use as a processing aid/additive. Use in closed process - Industrial: PROC01, PROC02, PROC03; 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: ERC07
Environmental contributing scenarios : **Use of functional fluid at industrial site - ERC07**
Health Contributing scenarios : **All PROCs (see above)**

Number of the ES	: 05
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Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Use of functional fluid at industrial site

Product characteristics : Liquid.
Amounts used : Annual site tonnage: ≤10 tonnes/year.
 Fraction of EU tonnage used in region: 0.046 %.
 Daily amount per site: ≤0.5 tonnes/day.
 Percentage of EU tonnage used at regional scale: 100 %.
Frequency and duration of use : Emission days: 20 days per year.
Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.
 Release factor after on-site risk management:
 water: 0.01 % (ESVOC SPERC 7.13a.v1).
 Local release rate: 0.05 kg/day.
 air: 1 % (ESVOC SPERC 7.13a.v1).
 Local release rate: 5 kg/day.
 Soil: 0.1 % (ESVOC SPERC 7.13a.v1).
Conditions and measures related to sewage treatment plant : Sewage Treatment Plant: Yes. (Efficiency of at least 90.4 %)
 Assumed domestic sewage treatment plant flow 2000 m³/d.
 Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal : Particular considerations on the waste treatment operations: No. (low risk)
 Waste disposal according to national/local legislation is sufficient

Contributing scenario controlling worker exposure for: All Contributing scenarios

Information concerning technical function: Corrosion inhibitor, Antiscaling agent.
Product characteristics : Liquid.
Concentration of substance in mixture or article : Covers concentrations up to 100 %.
Conditions and measures related to personal protection, hygiene and health evaluation
Personal protection : Use suitable eye protection.
 Wear suitable protective clothing.
 Wear suitable gloves.

Contributing scenario controlling worker exposure for 2: All PROCs (see above)

PROC01, PROC02, PROC03; see ES06.

Section 3 - Exposure estimation and reference to its source**Exposure estimation and reference to its source - Environment: 1: Use of functional fluid at industrial site****Exposure assessment (environment):** : EUSES**Exposure estimation** : Freshwater: 0.000672 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.042.Freshwater sediment: 0.323 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.042.Marine water: 0.0000667 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.033.Marine water sediment: 0.032 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.042.Sewage Treatment Plant: 0.002 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.Soil: 0.022 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.**Remark** : Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).**Exposure estimation and reference to its source - Workers: 2: All PROCs (see above)****Exposure assessment (human):** : see ES06**Exposure estimation** :**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.

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 at industrial sites; Use as a scavenging agent in refinery streams.

List of use descriptors : **Identified use name: ES 06:** Use at industrial sites; Use as a scavenging agent in refinery streams - Industrial: PROC01, PROC02, PROC03; ERC04
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

Environmental contributing scenarios : **Use of non-reactive processing aid at industrial site (no inclusion into or onto article) - ERC04**

Health Contributing scenarios : **Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - PROC01**
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC02
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition - PROC03

Number of the ES : 06

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Product characteristics : Liquid.

Amounts used : Annual site tonnage: ≤2210 tonnes/year.
 Fraction of EU tonnage used in region: 10 %.
 Daily amount per site: ≤6 tonnes/day.
 Percentage of EU tonnage used at regional scale: 100 %.

Frequency and duration of use : Emission days: 365 days per year.

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.
 Release factor after on-site risk management:
 water: 0.001 % (ESVOC SPERC 7.12a.v1).
 Local release rate: 0.06 kg/day.
 air: 0.25 % (ESVOC SPERC 7.12a.v1).
 Local release rate: 15 kg/day.
 Soil: 0 % (ESVOC SPERC 7.12a.v1).

Conditions and measures related to sewage treatment plant : Sewage Treatment Plant: Yes. (Efficiency of at least 90.4 %)
 Assumed domestic sewage treatment plant flow 2000 m³/d.
 Application of the STP sludge on agricultural soil: Yes.

Conditions and measures related to external treatment of waste for disposal : Particular considerations on the waste treatment operations: No. (low risk)
 Waste disposal according to national/local legislation is sufficient

Contributing scenario controlling worker exposure for: All Contributing scenarios

Information concerning technical function: Corrosion inhibitor, Antiscaling agent, Absorbent/Adsorbent (gas, Liquids).

Product characteristics : Liquid.

Concentration of substance in mixture or article : Covers concentrations up to 25 %.

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

Personal protection : Use suitable eye protection.
Wear suitable protective clothing.
Wear suitable gloves.

Contributing scenario controlling worker exposure for 2: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Frequency and duration of use/exposure : Exposure duration per day: <8 hours.

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 240 cm².

Technical conditions and measures at process level (source) to prevent release : Containment: Closed system.

Technical conditions and measures to control dispersion from source towards the worker : Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Advanced.

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

Personal protection : Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 %.

Contributing scenario controlling worker exposure for 3: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Frequency and duration of use/exposure : Exposure duration per day: <8 hours.

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 480 cm².

Technical conditions and measures at process level (source) to prevent release : Containment: Closed continuous process with occasional controlled exposure.

Technical conditions and measures to control dispersion from source towards the worker : Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Advanced.

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

Personal protection : Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.

Contributing scenario controlling worker exposure for 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Frequency and duration of use/exposure : Exposure duration per day: <8 hours.

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 240 cm².

Technical conditions and measures at process level (source) to prevent release : Containment: Closed batch process with occasional controlled exposure.

Ethylenediamine, EDA	Exposure Scenario: 06	Use at industrial sites; Use as a scavenging agent in refinery streams.
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article)		
Exposure assessment (environment):	: EUSES	
Exposure estimation	: Freshwater: 0.00072 mg/l. Risk characterisation ratio (PEC/PNEC): 0.045.	
	Freshwater sediment: 0.346 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.045.	
	Marine water: 0.00007146 mg/l. Risk characterisation ratio (PEC/PNEC): 0.036.	
	Marine water sediment: 0.034 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.045.	
	Sewage Treatment Plant: 0.003 mg/l. Risk characterisation ratio (PEC/PNEC): <0.01.	
	Soil: 0.027 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01.	
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 2: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 0.015 mg/m ³ . Risk characterisation ratio: <0.01.	
	Worker - dermal, long-term - systemic: 0.002 mg/cm ² . Risk characterisation ratio: <0.01.	
	Worker - combined, long-term - systemic: Risk characterisation ratio: <0.01.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 3: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 7.512 mg/m ³ . Risk characterisation ratio: 0.3.	
	Worker - dermal, long-term - systemic: 0.041 mg/cm ² . Risk characterisation ratio: 0.011.	
	Worker - combined, long-term - systemic:	

Ethylenediamine, EDA	Exposure Scenario: 06	Use at industrial sites; Use as a scavenging agent in refinery streams.
Remark	Risk characterisation ratio: 0.312. : Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 1.502 mg/m ³ . Risk characterisation ratio: 0.06. Worker - dermal, long-term - systemic: 0.021 mg/cm ² . Risk characterisation ratio: <0.01. Worker - combined, long-term - systemic: Risk characterisation ratio: 0.066.	
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.

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 : Widespread use by professional workers; Use as a processing aid/additive.
List of use descriptors : **Identified use name: ES 07:** Widespread use by professional workers; Use as a processing aid/additive - Professional: 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 : **Use as a processing aid/additive** - ERC09a, ERC09b
Health Contributing scenarios : **Use of functional fluids in small devices** - PROC20

Number of the ES	: 07
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Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Use as a processing aid/additive

Product characteristics : Liquid.
Amounts used : Daily amount per site: ≤ 0.012 tonnes/day.
 Percentage of EU tonnage used at regional scale: 10 %.
Other conditions affecting environmental exposure : Receiving surface water flow ≥ 18000 m³/d.
 Release factor after on-site risk management:
 water: 5 % (ERC).
 Local release rate: 0.608 kg/day.
 air: 5 % (ERC).
 Soil: 5 % (ERC).
Conditions and measures related to sewage treatment plant : Sewage Treatment Plant: Yes. (Efficiency of at least 90.4 %)
 Assumed domestic sewage treatment plant flow 2000 m³/d.
 Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal : Particular considerations on the waste treatment operations: No. (low risk)
 Waste disposal according to national/local legislation is sufficient

Contributing scenario controlling worker exposure for: All Contributing scenarios

Information concerning technical function: Corrosion inhibitor, Antiscaling agent.

Contributing scenario controlling worker exposure for 2: Use of functional fluids in small devices

Product characteristics : Liquid.
Concentration of substance in mixture or article : Covers concentrations up to 5 %.
Frequency and duration of use/exposure : Exposure duration per day: <8 hours.
Other conditions affecting workers exposure : Outdoor use or Indoor use.
 Temperature: $\leq 40^{\circ}\text{C}$.
 Exposed skin surface assumed: 480 cm².

Ethylenediamine, EDA	Exposure Scenario: 07	Widespread use by professional workers; Use as a processing aid/additive.
Technical conditions and measures to control dispersion from source towards the worker	: Occupational Health and Safety Management System: Basic	
Conditions and measures related to personal protection, hygiene and health evaluation		
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: Use as a processing aid/additive		
Exposure assessment (environment):	: EUSES	
Exposure estimation	: Freshwater: 0.003 mg/l. Risk characterisation ratio (PEC/PNEC): 0.208.	
	Freshwater sediment: 1.6 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.208.	
	Marine water: 0.0003325 mg/l. Risk characterisation ratio (PEC/PNEC): 0.166.	
	Marine water sediment: 0.16 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.208.	
	Sewage Treatment Plant: 0.029 mg/l. Risk characterisation ratio (PEC/PNEC): 0.058.	
	Soil: 0.256 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.059.	
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 2: Use of functional fluids in small devices		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 7.011 mg/m ³ . Risk characterisation ratio: 0.28.	
	Worker - dermal, long-term - systemic: 0.342 mg/cm ² . Risk characterisation ratio: 0.095.	
	Worker - combined, long-term - systemic: Risk characterisation ratio: 0.376.	
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.

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 at industrial sites; Industrial use of polymer - residual monomer.

List of use descriptors : **Identified use name: ES 08:** Use at industrial sites; Industrial use of polymer - residual monomer - Industrial: 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 : **Use at industrial site leading to inclusion into/onto article** - ERC05

Health Contributing scenarios : **Mixing or blending in batch processes** - PROC05
Industrial spraying - PROC07
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - PROC08a
Roller application or brushing - PROC10
Treatment of articles by dipping and pouring - PROC13
Tabletting, compression, extrusion, pelletisation, granulation - PROC14
Manual activities involving hand contact - PROC19
High (mechanical) energy work-up of substances bound in/on materials and/or articles - Indoor - PROC24
High (mechanical) energy work-up of substances bound in/on materials and/or articles - Outdoor - PROC24

Number of the ES : 08

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Use at industrial site leading to inclusion into/onto article

ERC06a, ERC06b, ERC06c, ERC06d (Covered by ERC05)

Product characteristics : Liquid.

Amounts used : Annual site tonnage: ≤400 tonnes/year.
 Fraction of EU tonnage used in region: 10 %.
 Daily amount per site: ≤0.8 tonnes/day (MSPERC).
 Percentage of EU tonnage used at regional scale: 100 %.

Frequency and duration of use : Emission days: 220 days per year.

Other conditions affecting environmental exposure : Indoor use/Outdoor use.

Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:

water: 0 % (FEICA SPERC 5.1b.v2).

Local release rate: 0 kg/day.

air: 1.7 % (FEICA SPERC 5.1b.v2).

Local release rate: 13.6 kg/day.

Soil: 0 % (FEICA SPERC 5.1b.v2).

Ethylenediamine, EDA	Exposure Scenario: 08	Use at industrial sites; Industrial use of polymer - residual monomer.
Technical conditions and measures at process level (source) to prevent release	: Dry process (no water used in process). Equipment cleaned with organic solvent, washings are collected and disposed of as solvent waste. Process with efficient use of raw materials.	
Conditions and measures related to sewage treatment plant	: Sewage Treatment Plant: Yes. (Efficiency of at least 100 %) Assumed domestic sewage treatment plant flow 2000 m ³ /d. Application of the STP sludge on agricultural soil: Yes.	
Conditions and measures related to external treatment of waste for disposal	: Particular considerations on the waste treatment operations: No. (low risk) Waste disposal according to national/local legislation is sufficient	
Contributing scenario controlling worker exposure for: All Contributing scenarios		
Information concerning technical function: Intermediate.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves.	
Contributing scenario controlling worker exposure for 2: Mixing or blending in batch processes		
Product characteristics	: Liquid.	
Concentration of substance in mixture or article	: Covers concentrations up to 5 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <8 hours.	
Other conditions affecting workers exposure	: Indoor use. Temperature: ≤40°C. Exposed skin surface assumed: 480 cm ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	
Contributing scenario controlling worker exposure for 3: Industrial spraying		
Product characteristics	: Liquid.	
Concentration of substance in mixture or article	: Concentration of the substance in the mixture: <1 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <8 hours.	
Other conditions affecting workers exposure	: Indoor use. Temperature: ≤40°C. Exposed skin surface assumed: 1500 cm ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.	
Contributing scenario controlling worker exposure for 4: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities		
Product characteristics	: Liquid.	
Concentration of substance in mixture or article	: Covers concentrations up to 5 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <8 hours.	
Date of issue/Date of revision	: 18/12/2019	Version : 11 / en 44/59

Ethylenediamine, EDA	Exposure Scenario: 08	Use at industrial sites; Industrial use of polymer - residual monomer.
Other conditions affecting workers exposure	: Indoor use. Temperature: ≤40°C. Exposed skin surface assumed: 960 cm ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	
Contributing scenario controlling worker exposure for 5: Roller application or brushing		
Product characteristics	: Liquid.	
Concentration of substance in mixture or article	: Covers concentrations up to 5 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <8 hours.	
Other conditions affecting workers exposure	: Indoor use. Temperature: ≤40°C. Exposed skin surface assumed: 960 cm ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	
Contributing scenario controlling worker exposure for 6: Treatment of articles by dipping and pouring		
Product characteristics	: Liquid.	
Concentration of substance in mixture or article	: Covers concentrations up to 5 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <8 hours.	
Other conditions affecting workers exposure	: Indoor use. Temperature: ≤40°C. Exposed skin surface assumed: 480 cm ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	
Contributing scenario controlling worker exposure for 7: Tableting, compression, extrusion, pelletisation, granulation		
Product characteristics	: Liquid.	
Concentration of substance in mixture or article	: Covers concentrations up to 5 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <8 hours.	
Other conditions affecting workers exposure	: Indoor use. Temperature: ≤40°C. Exposed skin surface assumed: 480 cm ² .	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	
Date of issue/Date of revision	: 18/12/2019	Version : 11 / en 45/59

Ethylenediamine, EDA	Exposure Scenario: 08	Use at industrial sites; Industrial use of polymer - residual monomer.
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced. Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %.	
Contributing scenario controlling worker exposure for 8: Manual activities involving hand contact		
Product characteristics	: Liquid.	
Concentration of substance in mixture or article	: Covers concentrations up to 5 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <1 hours.	
Other conditions affecting workers exposure	: Indoor use. Temperature: ≤40°C. Exposed skin surface assumed: 1980 cm ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear chemical-resistant gloves (tested to EN374) in combination with specific activity training. Dermal - minimum efficiency of 95 %.	
Respiratory protection	: Wear respiratory protection. Inhalation - minimum efficiency of 90 %.	
Contributing scenario controlling worker exposure for 9: High (mechanical) energy work-up of substances bound in/on materials and/or articles - Indoor		
Product characteristics	: Solid, medium dustiness.	
Concentration of substance in mixture or article	: Concentration of the substance in the mixture: <1 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <8 hours.	
Other conditions affecting workers exposure	: Indoor use. Temperature (liquid): ≤40°C. Temperature (solid): Ambient temperature. Exposed skin surface assumed: 240 cm ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced.	
Contributing scenario controlling worker exposure for 10: High (mechanical) energy work-up of substances bound in/on materials and/or articles - Outdoor		
Product characteristics	: Solid, medium dustiness.	
Concentration of substance in mixture or article	: Concentration of the substance in the mixture: <1 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <8 hours.	
Other conditions affecting workers exposure	: Outdoor use. Temperature (liquid): ≤40°C. Temperature (solid): Ambient temperature. Exposed skin surface assumed: 240 cm ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced.	

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Use at industrial site leading to inclusion into/ onto article

Exposure assessment (environment):	: EUSES
Exposure estimation	: Freshwater: 0.0004345 mg/l. Risk characterisation ratio (PEC/PNEC): 0.027.
	Freshwater sediment: 0.209 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.027.
	Marine water: 0.00004287 mg/l. Risk characterisation ratio (PEC/PNEC): 0.021.
	Marine water sediment: 0.021 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.027.
	Sewage Treatment Plant: 0 mg/l. Risk characterisation ratio (PEC/PNEC): <0.01.
	Soil: 0.002 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01.
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 2: Mixing or blending in batch processes

Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	: Worker - inhalative, long-term - systemic: 2.504 mg/m ³ . Risk characterisation ratio: 0.1.
	Worker - dermal, long-term - systemic: 0.137 mg/cm ² . Risk characterisation ratio: 0.038.
	Worker - combined, long-term - systemic: Risk characterisation ratio: 0.138.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 3: Industrial spraying

Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	: Worker - inhalative, long-term - systemic: 3.13 mg/m ³ . Risk characterisation ratio: 0.125.
	Worker - dermal, long-term - systemic: 0.214 mg/cm ² . Risk characterisation ratio: 0.06.
	Worker - combined, long-term - systemic: Risk characterisation ratio: 0.185.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 4: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	: Worker - inhalative, long-term - systemic: 2.504 mg/m ³ . Risk characterisation ratio: 0.1. Worker - dermal, long-term - systemic: 0.137 mg/cm ² . Risk characterisation ratio: 0.038. Worker - combined, long-term - systemic: Risk characterisation ratio: 0.138.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 5: Roller application or brushing

Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	: Worker - inhalative, long-term - systemic: 2.504 mg/m ³ . Risk characterisation ratio: 0.1. Worker - dermal, long-term - systemic: 0.274 mg/cm ² . Risk characterisation ratio: 0.076. Worker - combined, long-term - systemic: Risk characterisation ratio: 0.176.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: Treatment of articles by dipping and pouring

Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	: Worker - inhalative, long-term - systemic: 2.504 mg/m ³ . Risk characterisation ratio: 0.1. Worker - dermal, long-term - systemic: 0.137 mg/cm ² . Risk characterisation ratio: 0.038. Worker - combined, long-term - systemic: Risk characterisation ratio: 0.138.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 7: Tableting, compression, extrusion, pelletisation, granulation

Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	: Worker - inhalative, long-term - systemic: 2.504 mg/m ³ . Risk characterisation ratio: 0.1. Worker - dermal, long-term - systemic: 0.137 mg/cm ² . Risk characterisation ratio: 0.038. Worker - combined, long-term - systemic: Risk characterisation ratio: 0.138.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Ethylenediamine, EDA	Exposure Scenario: 08	Use at industrial sites; Industrial use of polymer - residual monomer.
Exposure estimation and reference to its source - Workers: 8: Manual activities involving hand contact		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 0.501 mg/m ³ . Risk characterisation ratio: 0.02.	
	Worker - dermal, long-term - systemic: 0.283 mg/cm ² . Risk characterisation ratio: 0.079.	
	Worker - combined, long-term - systemic: Risk characterisation ratio: 0.099.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 9: High (mechanical) energy work-up of substances bound in/on materials and/or articles - Indoor		
Exposure assessment (human):	: ECETOC TRA Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 1 mg/m ³ . Risk characterisation ratio: 0.04.	
	Worker - dermal, long-term - systemic: 0.288 mg/cm ² . Risk characterisation ratio: 0.08.	
	Worker - combined, long-term - systemic: Risk characterisation ratio: 0.12.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	
Exposure estimation and reference to its source - Workers: 10: High (mechanical) energy work-up of substances bound in/on materials and/or articles - Outdoor		
Exposure assessment (human):	: ECETOC TRA Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 0.75 mg/m ³ . Risk characterisation ratio: 0.03.	
	Worker - dermal, long-term - systemic: 0.288 mg/cm ² . Risk characterisation ratio: 0.08.	
	Worker - combined, long-term - systemic: Risk characterisation ratio: 0.11.	
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.

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 : Widespread use by professional workers; Monomer use in epoxy, PU, adhesives, coatings and other polymers.

List of use descriptors : **Identified use name: ES 09:** Widespread use by professional workers; Monomer use in epoxy, PU, adhesives, coatings and other polymers - Professional: 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 : **Widespread use leading to inclusion into/onto article (indoor) - ERC08c**

Health Contributing scenarios : **Mixing or blending in batch processes - Indoor - PROC05**
Mixing or blending in batch processes - Outdoor - PROC05
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (indoor) - PROC08a
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (outdoor) - PROC08a
Roller application or brushing - Indoor - PROC10
Roller application or brushing - Outdoor - PROC10
Non industrial spraying - Indoor - PROC11
Non industrial spraying - Outdoor - PROC11
Treatment of articles by dipping and pouring - PROC13
Tabletting, compression, extrusion, pelletisation, granulation - PROC14
Manual activities involving hand contact - PROC19
High (mechanical) energy work-up of substances bound in/on materials and/or articles - Indoor - PROC24
High (mechanical) energy work-up of substances bound in/on materials and/or articles - Outdoor - PROC24

Number of the ES	: 09
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Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Widespread use leading to inclusion into/onto article (indoor)

ERC08f (Covered by ERC08c)

Product characteristics : Liquid.

Amounts used : Daily amount per site: ≤0.002 tonnes/day.
 Fraction of Regional tonnage used locally: 0.002.
 Percentage of EU tonnage used at regional scale: 10 %.

Frequency and duration of use : Emission days: 365 days per year.

Other conditions affecting environmental exposure : Indoor use/Outdoor use.
 Receiving surface water flow ≥18000 m³/d.
 Release factor after on-site risk management:
 water: 1.5 % (FEICA SPERC 8c.3.v2).
 Local release rate: 0.033 kg/day.

Ethylenediamine, EDA	Exposure Scenario: 09	Widespread use by professional workers; Monomer use in epoxy, PU, adhesives, coatings and other polymers.
Technical conditions and measures at process level (source) to prevent release	air: 0 % (FEICA SPERC 8c.3.v2). Soil: 0 % (FEICA SPERC 8c.3.v2).	
Conditions and measures related to sewage treatment plant	: Application of solvent-borne or water-borne products. Equipment cleaned with water, washing disposed of with wastewater. Process with efficient use of raw materials.	
Conditions and measures related to external treatment of waste for disposal	: Sewage Treatment Plant: Yes. (Efficiency of at least 90.4 %) Assumed domestic sewage treatment plant flow 2000 m ³ /d. Application of the STP sludge on agricultural soil: Yes.	
	: Particular considerations on the waste treatment operations: No. (low risk) Waste disposal according to national/local legislation is sufficient	
Contributing scenario controlling worker exposure for: All Contributing scenarios		
Information concerning technical function: Intermediate.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Use suitable eye protection. Wear suitable protective clothing. Wear suitable gloves.	
Contributing scenario controlling worker exposure for 2: Mixing or blending in batch processes - Indoor		
Product characteristics	: Covers concentrations up to 5 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <8 hours.	
Other conditions affecting workers exposure	: Indoor use. Room size: Assumes large workrooms. Temperature: ≤40°C. Exposed skin surface assumed: 480 cm ² . Activity/Process: Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces. Open surface: <0.1 m ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Ventilation rate: 3 ach (air changes per hour). Occupational Health and Safety Management System: Basic.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %.	
Contributing scenario controlling worker exposure for 3: Mixing or blending in batch processes - Outdoor		
Product characteristics	: Covers concentrations up to 5 %.	
Frequency and duration of use/exposure	: Exposure duration per day: <8 hours.	
Other conditions affecting workers exposure	: Outdoor use. Temperature: ≤40°C. Exposed skin surface assumed: 480 cm ² . Activity/Process: Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces. Open surface: <0.1 m ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Occupational Health and Safety Management System: Basic.	
Conditions and measures related to personal protection, hygiene and health evaluation		
Personal protection	: Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %.	

Contributing scenario controlling worker exposure for 4: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (indoor)**Product characteristics** : Covers concentrations up to 5 %.**Frequency and duration of use/exposure** : Exposure duration per day: <8 hours.**Other conditions affecting workers exposure** : Indoor use.
Room size: Assumes large workrooms.
Temperature: ≤40°C.
Exposed skin surface assumed: 960 cm².
Activity/Process: Transfer of liquid products - falling liquids.
Transferring: 10 - 100 L/min.
Splash loading.**Technical conditions and measures to control dispersion from source towards the worker** : Ventilation rate: 3 ach (air changes per hour).
Occupational Health and Safety Management System: Basic.
Local exhaust ventilation: Inhalation - minimum efficiency of 50 %.**Conditions and measures related to personal protection, hygiene and health evaluation****Personal protection** : Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %.**Contributing scenario controlling worker exposure for 5: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (outdoor)****Product characteristics** : Covers concentrations up to 5 %.**Frequency and duration of use/exposure** : Exposure duration per day: <8 hours.**Other conditions affecting workers exposure** : Outdoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 960 cm².
Activity/Process: Transfer of liquid products - falling liquids.
Transferring: 10 - 100 L/min.
Splash loading.**Technical conditions and measures to control dispersion from source towards the worker** : Occupational Health and Safety Management System: Basic.
Local exhaust ventilation: Inhalation - minimum efficiency of 50 %.**Conditions and measures related to personal protection, hygiene and health evaluation****Personal protection** : Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %.**Contributing scenario controlling worker exposure for 6: Roller application or brushing - Indoor****Product characteristics** : Concentration of the substance in the mixture: <1 %.**Frequency and duration of use/exposure** : Exposure duration per day: <8 hours.**Other conditions affecting workers exposure** : Indoor use.
Temperature (liquid): ≤40°C.
Temperature (solid): Ambient temperature.
Exposed skin surface assumed: 960 cm².
Activity/Process: Spreading of liquids at surfaces or work pieces >3 m²/hour.**Technical conditions and measures to control dispersion from source towards the worker** : Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Occupational Health and Safety Management System: Basic.
Local exhaust ventilation: Inhalation - minimum efficiency of 80 %.
or
Wear respiratory protection. Inhalation - minimum efficiency of 90 %.**Conditions and measures related to personal protection, hygiene and health evaluation****Personal protection** : Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %.

Contributing scenario controlling worker exposure for 7: Roller application or brushing - Outdoor

Product characteristics : Concentration of the substance in the mixture: <1 %.

Frequency and duration of use/exposure : Exposure duration per day: <8 hours.

Other conditions affecting workers exposure : Outdoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 960 cm².

Technical conditions and measures to control dispersion from source towards the worker : Occupational Health and Safety Management System: Basic.

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

Personal protection : Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %.

Respiratory protection : Wear respiratory protection. Inhalation - minimum efficiency of 90 %.

Contributing scenario controlling worker exposure for 8: Non industrial spraying - Indoor

Product characteristics : Concentration of the substance in the mixture: <1 %.

Frequency and duration of use/exposure : Exposure duration per day: <8 hours.

Other conditions affecting workers exposure : Indoor use.
Temperature (liquid): ≤40°C.
Temperature (solid): Ambient temperature.
Exposed skin surface assumed: 1500 cm².

Technical conditions and measures to control dispersion from source towards the worker : Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Occupational Health and Safety Management System: Basic.

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

Personal protection : Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %.

Respiratory protection : Wear respiratory protection. Inhalation - minimum efficiency of 90 %.

Contributing scenario controlling worker exposure for 9: Non industrial spraying - Outdoor

Product characteristics : Concentration of the substance in the mixture: <1 %.

Frequency and duration of use/exposure : Exposure duration per day: <8 hours.

Other conditions affecting workers exposure : Outdoor use.
Temperature (liquid): ≤40°C.
Temperature (solid): Ambient temperature.
Exposed skin surface assumed: 1500 cm².

Technical conditions and measures to control dispersion from source towards the worker : Occupational Health and Safety Management System: Basic.

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

Personal protection : Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %.

Respiratory protection : Wear respiratory protection. Inhalation - minimum efficiency of 90 %.

Contributing scenario controlling worker exposure for 10: Treatment of articles by dipping and pouring

Product characteristics : Covers concentrations up to 5 %.

Frequency and duration of use/exposure : Exposure duration per day: <8 hours.

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 480 cm².

Technical conditions and measures to control dispersion from source towards the worker : Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Basic.
Local exhaust ventilation: Inhalation - minimum efficiency of 80 %.

Ethylenediamine, EDA	Exposure Scenario: 09	Widespread use by professional workers; Monomer use in epoxy, PU, adhesives, coatings and other polymers.
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Conditions and measures related to personal protection, hygiene and health evaluation
Personal protection : Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %.

Contributing scenario controlling worker exposure for 11: Tableting, compression, extrusion, pelletisation, granulation

Product characteristics : Covers concentrations up to 5 %.
Frequency and duration of use/exposure : Exposure duration per day: <8 hours.
Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 480 cm².
Technical conditions and measures to control dispersion from source towards the worker : Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Basic.
Local exhaust ventilation: Inhalation - minimum efficiency of 80 %.

Conditions and measures related to personal protection, hygiene and health evaluation
Personal protection : Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %.

Contributing scenario controlling worker exposure for 12: Manual activities involving hand contact

Product characteristics : Covers concentrations up to 5 %.
Frequency and duration of use/exposure : Exposure duration per day: <1 hours.
Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.
Exposed skin surface assumed: 1980 cm².
Technical conditions and measures to control dispersion from source towards the worker : Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Basic.

Conditions and measures related to personal protection, hygiene and health evaluation
Personal protection : Wear suitable gloves tested to EN374. Dermal - minimum efficiency of 80 %.
Respiratory protection : Wear respiratory protection. Inhalation - minimum efficiency of 90 %.

Contributing scenario controlling worker exposure for 13: High (mechanical) energy work-up of substances bound in/on materials and/or articles - Indoor

Product characteristics : Solid, medium dustiness.
Concentration of substance in mixture or article : Concentration of the substance in the mixture: <1 %.
Frequency and duration of use/exposure : Exposure duration per day: <8 hours.
Other conditions affecting workers exposure : Indoor use.
Temperature (solid): Ambient temperature.
Exposed skin surface assumed: 240 cm².
Technical conditions and measures to control dispersion from source towards the worker : Occupational Health and Safety Management System: Basic.

Contributing scenario controlling worker exposure for 14: High (mechanical) energy work-up of substances bound in/on materials and/or articles - Outdoor

Product characteristics : Solid, medium dustiness.
Concentration of substance in mixture or article : Concentration of the substance in the mixture: <1 %.
Frequency and duration of use/exposure : Exposure duration per day: <8 hours.

Ethylenediamine, EDA	Exposure Scenario: 09	Widespread use by professional workers; Monomer use in epoxy, PU, adhesives, coatings and other polymers.
Other conditions affecting workers exposure	: Outdoor use. Temperature (solid): Ambient temperature. Exposed skin surface assumed: 240 cm ² .	
Technical conditions and measures to control dispersion from source towards the worker	: Occupational Health and Safety Management System: Basic.	

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Widespread use leading to inclusion into/ onto article (indoor)		
Exposure assessment (environment):	: EUSES	
Exposure estimation	: Freshwater: 0.0005917 mg/l. Risk characterisation ratio (PEC/PNEC): 0.037.	
	Freshwater sediment: 0.284 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.037.	
	Marine water: 0.0000586 mg/l. Risk characterisation ratio (PEC/PNEC): 0.029.	
	Marine water sediment: 0.028 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.037.	
	Sewage Treatment Plant: 0.002 mg/l. Risk characterisation ratio (PEC/PNEC): <0.01.	
	Soil: 0.015 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01.	
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 2: Mixing or blending in batch processes - Indoor		
Exposure assessment (human):	: Inhalation exposure: ART v1.0 Dermal exposure: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 1.9 mg/m ³ . Risk characterisation ratio: 0.076.	
	Worker - dermal, long-term - systemic: 0.548 mg/cm ² . Risk characterisation ratio: 0.152.	
	Worker - combined, long-term - systemic: Risk characterisation ratio: 0.228.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 3: Mixing or blending in batch processes - Outdoor		
Exposure assessment (human):	: Inhalation exposure: ART v1.0 Dermal exposure: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	

Ethylenediamine, EDA	Exposure Scenario: 09	Widespread use by professional workers; Monomer use in epoxy, PU, adhesives, coatings and other polymers.
Exposure estimation	<p>Worker - inhalative, long-term - systemic: 0.69 mg/m³. Risk characterisation ratio: 0.028.</p> <p>Worker - dermal, long-term - systemic: 0.548 mg/cm². Risk characterisation ratio: 0.152.</p> <p>Worker - combined, long-term - systemic: Risk characterisation ratio: 0.18.</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: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (indoor)		
Exposure assessment (human):	: Inhalation exposure: ART v1.0 Dermal exposure: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	<p>Worker - inhalative, long-term - systemic: 5.8 mg/m³. Risk characterisation ratio: 0.232.</p> <p>Worker - dermal, long-term - systemic: 0.548 mg/cm². Risk characterisation ratio: 0.152.</p> <p>Worker - combined, long-term - systemic: Risk characterisation ratio: 0.384.</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: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (outdoor)		
Exposure assessment (human):	: Inhalation exposure: ART v1.0 Dermal exposure: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	<p>Worker - inhalative, long-term - systemic: 2.1 mg/m³. Risk characterisation ratio: 0.084.</p> <p>Worker - dermal, long-term - systemic: 0.548 mg/cm². Risk characterisation ratio: 0.152.</p> <p>Worker - combined, long-term - systemic: Risk characterisation ratio: 0.236.</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: Roller application or brushing - Indoor		
Exposure assessment (human):	: Inhalation exposure: ART v1.0 Dermal exposure: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	<p>Worker - inhalative, long-term - systemic: 2.2 mg/m³. Risk characterisation ratio: 0.088.</p> <p>Worker - dermal, long-term - systemic: 0.549 mg/cm². Risk characterisation ratio: 0.152.</p> <p>Worker - combined, long-term - systemic: Risk characterisation ratio: 0.24.</p>	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Ethylenediamine, EDA	Exposure Scenario: 09	Widespread use by professional workers; Monomer use in epoxy, PU, adhesives, coatings and other polymers.
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Exposure estimation and reference to its source - Workers: 7: Roller application or brushing - Outdoor		
Exposure assessment (human):	: Inhalation exposure: ART v1.0 Dermal exposure: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 1.764 mg/m ³ . Risk characterisation ratio: 0.071.	
	: Worker - dermal, long-term - systemic: 0.549 mg/cm ² . Risk characterisation ratio: 0.152.	
	: Worker - combined, long-term - systemic: Risk characterisation ratio: 0.223.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 8: Non industrial spraying - Indoor		
Exposure assessment (human):	: Inhalation exposure: ART v1.0 Dermal exposure: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 3.8 mg/m ³ . Risk characterisation ratio: 0.152.	
	: Worker - dermal, long-term - systemic: 2.143 mg/cm ² . Risk characterisation ratio: 0.595.	
	: Worker - combined, long-term - systemic: Risk characterisation ratio: 0.747.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 9: Non industrial spraying - Outdoor		
Exposure assessment (human):	: Inhalation exposure: ART v1.0 Dermal exposure: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 1.4 mg/m ³ . Risk characterisation ratio: 0.056.	
	: Worker - dermal, long-term - systemic: 2.143 mg/cm ² . Risk characterisation ratio: 0.595.	
	: Worker - combined, long-term - systemic: Risk characterisation ratio: 0.651.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Exposure estimation and reference to its source - Workers: 10: Treatment of articles by dipping and pouring		
Exposure assessment (human):	: ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.	
Exposure estimation	: Worker - inhalative, long-term - systemic: 10.02 mg/m ³ . Risk characterisation ratio: 0.401.	
	: Worker - dermal, long-term - systemic: 0.548 mg/cm ² . Risk characterisation ratio: 0.152.	
	: Worker - combined, long-term - systemic: Risk characterisation ratio: 0.553.	
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).	

Ethylenediamine, EDA	Exposure Scenario: 09	Widespread use by professional workers; Monomer use in epoxy, PU, adhesives, coatings and other polymers.
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Exposure estimation and reference to its source - Workers: 11: Tableting, compression, extrusion, pelletisation, granulation

Exposure assessment (human): : ECETOC TRA worker v3
Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.

Exposure estimation : **Worker - inhalative, long-term - systemic:** 10.02 mg/m³.
Risk characterisation ratio: 0.401.

Worker - dermal, long-term - systemic: 0.137 mg/cm².
Risk characterisation ratio: 0.038.

Worker - combined, long-term - systemic:
Risk characterisation ratio: 0.439.

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

Exposure estimation and reference to its source - Workers: 12: Manual activities involving hand contact

Exposure assessment (human): : ECETOC TRA worker v3
Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.

Exposure estimation : **Worker - inhalative, long-term - systemic:** 1.002 mg/m³.
Risk characterisation ratio: 0.04.

Worker - dermal, long-term - systemic: 1.131 mg/cm².
Risk characterisation ratio: 0.314.

Worker - combined, long-term - systemic:
Risk characterisation ratio: 0.354.

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

Exposure estimation and reference to its source - Workers: 13: High (mechanical) energy work-up of substances bound in/on materials and/or articles - Indoor

Exposure assessment (human): : ECETOC TRA
Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.

Exposure estimation : **Worker - inhalative, long-term - systemic:** 2 mg/m³.
Risk characterisation ratio: 0.08.

Worker - dermal, long-term - systemic: 0.288 mg/cm².
Risk characterisation ratio: 0.08.

Worker - combined, long-term - systemic:
Risk characterisation ratio: 0.16.

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

Exposure estimation and reference to its source - Workers: 14: High (mechanical) energy work-up of substances bound in/on materials and/or articles - Outdoor

Exposure assessment (human): : ECETOC TRA
Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.

Exposure estimation : **Worker - inhalative, long-term - systemic:** 1.5 mg/m³.
Risk characterisation ratio: 0.06.

Worker - dermal, long-term - systemic: 0.288 mg/cm².
Risk characterisation ratio: 0.08.

Worker - combined, long-term - systemic:
Risk characterisation ratio: 0.14.

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.