SAFETY DATA SHEET



N-Aminoethylpiperazine, AEP

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

1.1 Product identifier

Product name	: N-Aminoethylpiperazine, AEP
Index number	: 612-105-00-4
EC number	: 205-411-0
REACH Registration number	

Registration numberLegal entity01-2119471486-30-0003-CAS number: 140-31-8Other means of: -identification

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

Pro	duct	use
	~~~~	

: Intermediate. Chemical synthesis.

Identified uses ES01: Manufacture - Industrial: PROC01, PROC02, PROC03, PROC08b, PROC15, PROC28; ERC01. ES02: Formulation and (re)packing of substances and mixtures - Industrial: PROC01, PROC02, PROC03, PROC08b, PROC09, PROC15, PROC28; ERC02.

**ES03:** Industrial Use in Epoxy/PU Curing Industrial - Industrial: PROC01, PROC02, PROC03, PROC07, PROC08b, PROC10, PROC15, PROC28; ERC06d.

**ES04:** Professional Use in Epoxy/PU Curing - Professional: PC01; PROC01, PROC05, PROC06, PROC08a, PROC10, PROC11, PROC19, PROC28; ERC08b, ERC08e.

**ES05:** Monomer in Polymer Manufacture of polyamides and copolymers - Industrial: PROC01, PROC02, PROC03, PROC06, PROC08b, PROC14, PROC15, PROC28; ERC04.

ES06: Gas Sweetening - Industrial: PROC01, PROC02, PROC03, PROC08b, PROC28; ERC07.

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

e-mail address of person responsible for this SDS	:	sds.delamine@delamine.com
The Netherlands Telephone number: +31 3342	24(	600
Stationsplein 121		
		-

#### 1.4 Emergency telephone number

Supplier

Telephone number	: +1 352 323 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]

# **SECTION 2: Hazards identification**

Acute Tox. 4, H302 Acute Tox. 3, H311 Skin Corr. 1B, H314 Eye Dam. 1, H318 Skin Sens. 1, H317 Repr. 2, H361 (oral) STOT RE 1, H372 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	<ul> <li>H302 - Harmful if swallowed.</li> <li>H311 - Toxic in contact with skin.</li> <li>H314 - Causes severe skin burns and eye damage.</li> <li>H317 - May cause an allergic skin reaction.</li> <li>H361 - Suspected of damaging fertility or the unborn child. (oral)</li> <li>H372 - Causes damage to organs through prolonged or repeated exposure.</li> <li>H412 - Harmful to aquatic life with long lasting effects.</li> </ul>
Precautionary statements	
Prevention	<ul> <li>▶201 - Obtain special instructions before use.</li> <li>▶280 - Wear protective gloves, protective clothing and eye or face protection.</li> <li>▶273 - Avoid release to the environment.</li> <li>▶260 - Do not breathe vapour.</li> </ul>
Response	<ul> <li>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 doctor.</li> <li>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 doctor.</li> </ul>
Storage	: Not applicable.
Disposal	: Not applicable.
Hazardous ingredients	: 2-piperazin-1-ylethylamine
Supplemental label elements	: Not applicable.
Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles	: Not applicable.

2.3 Other hazards

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

:	PBT	Р	В	Т	vPvB	vP	vB
	No	Yes	No	Yes	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	%	Classification	Туре
2-piperazin-1-ylethylamine	REACH #: 01-2119471486-30 EC: 205-411-0 CAS: 140-31-8 Index: 612-105-00-4	98 - 100	Acute Tox. 4, H302 Acute Tox. 3, H311 Skin Corr. 1B, H314 Eye Dam. 1, H318 Skin Sens. 1, H317 Repr. 2, H361 (oral) STOT RE 1, H372 (respiratory tract) (inhalation) Aquatic Chronic 3, H412	[1]
2-(2-aminoethylamino)ethanol	REACH #: 01-2119456894-24 EC: 203-867-5 CAS: 111-41-1 Index: 603-194-00-0	0.2	Skin Corr. 1B, H314 Eye Dam. 1, H318 Skin Sens. 1B, H317 Repr. 1B, H360 Lact., H362 See Section 16 for the full text of the H statements declared above.	[2]
Product/ingredient name		Specific C	onc. Limits, M-factors and ATEs	
2-piperazin-1-ylethylamine	ATE		ATE [Oral] = 500 mg/kg ATE [Dermal] = 866 mg/kg	
2-(2-aminoethylamino)ethanol		-		

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.

<u>Type</u>

[1] Constituent

[2] Impurity

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

## **SECTION 4: First aid measures**

#### 4.1 Description of first aid measures

Eye contact	: Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.
Inhalation	: Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
Skin contact	: Get medical attention immediately. Call a poison center or physician. Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingention	· Cot modical attention immediately. Coll a poison center or physician. Week out
ingestion	Call a poison center of physician. Wash out mouth with water. Remove dentures if any. 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 :	No known significant effects or critical hazards.
Skin contact :	Causes severe burns. Toxic in contact with skin. May cause an allergic skin reaction.
Ingestion :	Harmful if swallowed.
Over-exposure signs/symptom	<u>IS</u>
Eye contact :	Adverse symptoms may include the following: pain watering redness
Inhalation :	No specific data.
Skin contact :	Adverse symptoms may include the following: pain or irritation redness blistering may occur
Ingestion :	Adverse symptoms may include the following: stomach pains reduced foetal weight increase in foetal deaths skeletal malformations

#### 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, CO ₂ , 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

Hazards from the	: In a fire or if heated, a pressure increase will occur and the container may burst. This
substance or mixture	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.

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SECTION 5: Firefight	ting measures
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.
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, prot	ective equipment and emergency procedures
For non-emergency personnel	: No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Do not breathe vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
For emergency responders	: If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
6.2 Environmental precautions	: Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.
6.3 Methods and material for c	ontainment and cleaning up
Small spill	: Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
Large spill	: Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product.
6.4 Reference to other sections	: See Section 1 for emergency contact information. See Section 8 for information on appropriate personal protective equipment. See Section 13 for additional waste treatment information.

# **SECTION 7: Handling and storage**

# 7.1 Precautions for safe handling Protective measures Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapour or mist. Do not breathe dust or mist. Do not ingest. Avoid release to the environment. If during normal use the material presents a respiratory hazard, use

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# **SECTION 7: Handling and storage**

	only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.
Advice on general occupational hygiene	: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

#### 7.2 Conditions for safe storage, including any incompatibilities

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

#### 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.

#### **Biological exposure indices**

None known.

# Recommended monitoring procedures

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

#### **DNELs/DMELs**

Product/ingredient name	Туре	Exposure	Value	Population	Effects
2-piperazin-1-ylethylamine	DNEL	Long term Inhalation	10.6 mg/m ³	Workers	Systemic
	DNEL	Short term Inhalation	10.6 mg/m ³	Workers	Systemic
	DNEL	Long term Inhalation	15 µg/m³	Workers	Local
	DNEL	Short term Inhalation	80 µg/m³	Workers	Local
	DNEL	Long term Dermal	3.33 mg/ kg bw/day	Workers	Systemic
2-(2-aminoethylamino)ethanol	DNEL	Long term Inhalation	0.704 mg/ m³	Workers	Systemic
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## **SECTION 8: Exposure controls/personal protection**

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	DNEL	Long term Dermal	2 mg/kg bw/day	Workers	Systemic	
	DNEL	Long term Inhalation	0.174 mg/ m³	General population	Systemic	
	DNEL	Long term Dermal	1 mg/kg bw/day	General population	Systemic	
	DNEL	Long term Oral	0.1 mg/kg bw/day	General population	Systemic	

**PNECs** 

Product/ingredient name	Compartment Detail	Value	Method Detail
2-piperazin-1-ylethylamine	Fresh water	0.058 mg/l	Assessment Factors
	Marine water	0.006 mg/l	Assessment Factors
	Fresh water sediment	215 mg/kg dwt	Equilibrium Partitioning
	Marine water sediment	21.5 mg/kg dwt	Equilibrium Partitioning
	Sewage Treatment Plant	250 mg/l	Assessment Factors
	Soil	1 mg/kg dwt	Assessment Factors
	Intermittent release	0.58 mg/l	Assessment Factors
2-(2-aminoethylamino)ethanol	Fresh water	0.022 mg/l	Assessment Factors
	Marine water	0.002 mg/l	Assessment Factors
	Sewage Treatment Plant	82.2 mg/l	Assessment Factors
	Fresh water sediment	0.172 mg/kg dwt	Assessment Factors
	Marine water sediment	0.017 mg/kg dwt	Assessment Factors
	Soil	0.019 mg/kg dwt	Assessment Factors

#### 8.2 Exposure controls Appropriate engineering : If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to controls airborne contaminants below any recommended or statutory limits. Individual protection measures : Wash hands, forearms and face thoroughly after handling chemical products, before Hygiene measures 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: Wear tightly-sealed safety glasses (EN 166). Wear suitable face shield. If inhalation hazards exist, a fullface 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. <b>Recommended:</b> 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.
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. <b>Recommended:</b> 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**

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

#### 9.1 Information on basic physical and chemical properties

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Explosive properties	: N	Not cons	sidered to be a produ	ict presenting a	risk of explosion	•		
Viscosity	: [	Dynamio	c: 14.1 mPa·s					
Decomposition temperature	: N	Not avai	lable.					
Auto-ignition temperature	: >	>300°C						
Partition coefficient: n-octanol/ water	1 : -	-1.48						
Miscible with water	: ነ	Yes.						
Solubility in water	: 1	100 g/l						
Density	: 0	0.98 g/c	m³ [20°C]					
Relative density	: ١	Not avai	lable.					
Vapour density	: 4	4.4 [Air =	= 1]					
Vapour pressure	: 0	0.0052 k	(Pa					
Lower and upper explosion limit	: L ו	Lower: 1 Upper: 9	l.1% 9.4%					
Flammability	: ١	Not appl	licable.					
Evaporation rate	: ١	Not avai	lable.					
Flash point	: (	Closed o	cup: 99°C (210.2°F) [	ASTM D 93-07]				
Initial boiling point and boiling range	: 2	220.4°C						
Melting point/freezing point	: -	-19°C						
рН	: 1	11.4						
Odour threshold	: ١	Not avai	lable.					
Odour	: /	Ammoni	ia.					
Colour	: (	Clear. C	olourless.					
Physical state	: 1	iauid.						
Appearance								

# **SECTION 9: Physical and chemical properties**

Oxidising properties	: Not applicable
Particle characteristics	
Median particle size	: Not applicable

#### 9.2 Other information

No additional information.

<b>SECTION 10: Stabilit</b>	y a	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	:	aerosol or mist formation. Keep away from heat, sparks and flame. Do not smoke.
10.5 Incompatible materials	:	Reactive or incompatible with the following materials: oxidising 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 hazard classes as defined in Regulation (EC) No 1272/2008

#### Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure	Remarks
2-piperazin- 1-ylethylamine	LD50 Dermal	Rabbit - Male	866 mg/kg	-	-
	LD50 Oral	Rat - Male	2140 mg/kg	-	-
2-(2-aminoethylamino) ethanol	LD50 Dermal [OECD 402]	Rat - Male, Female	>2000 mg/kg	-	-
	LD50 Oral [OECD 401]	Rat - Male, Female	2150 mg/kg	-	-

**Conclusion/Summary** : Toxic in contact with skin. Harmful if swallowed.

#### 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)
2-piperazin-1-ylethylamine	500	866	N/A	N/A	N/A

#### Irritation/Corrosion

# **SECTION 11: Toxicological information**

Product/ingredient name	Result	Species	Score	Exposure	Observation	Remarks	
2-piperazin- 1-ylethylamine	Eyes - Severe irritant	Rabbit	-	-	7 days	-	
	Skin - Visible necrosis	Rabbit	-	24 hours	24 hours	-	
2-(2-aminoethylamino) ethanol	Eyes - Oedema of the conjunctivae [OECD 405]	Rabbit	3	24 hours	8 days	-	
	Skin - Visible necrosis [OECD 404]	Rabbit	-	4 hours	14 days	-	

#### **Conclusion/Summary**

: Causes severe burns.

Skin

: Causes serious eye damage.

Eyes

: Not available.

#### Respiratory Sensitisation

Product/ingredient name	Route of exposure	Species	Result	Remarks
2-piperazin- 1-ylethylamine	skin	Guinea pig	Sensitising [OECD 406]	-
2-(2-aminoethylamino) ethanol	skin	Mouse	Sensitising [OECD 429]	-

#### **Conclusion/Summary**

Skin

: May cause an allergic skin reaction.

Respiratory

: Not available.

#### **Mutagenicity**

Product/ingredient name	Test	Experiment	Result	Remarks
2-piperazin- 1-ylethylamine	OECD 471	Experiment: In vitro Subject: Bacteria	Negative	-
	OECD 490	Experiment: In vitro Subject: Mammalian- Animal	Negative	-
	EPA 560/6-83-001	Experiment: In vivo Subject: Mammalian- Animal	Negative	-
2-(2-aminoethylamino) ethanol	OECD 477	Experiment: In vivo Subject: Insect Cell: Germ	Negative	-

Conclusion/Summary

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

**Carcinogenicity** 

: Not available.

#### Conclusion/Summary Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility	Developmental toxin	Species	Dose	Exposure	Remarks

# **SECTION 11: Toxicological information**

2-piperazin- 1-ylethylamine	Negative	-	Positive	Rabbit	Oral: 150 mg/kg NOAEL	-	OECD 414
	Negative	Negative	Negative	Rat	Oral: 598 mg/kg NOAEL	-	OECD 422
2-(2-aminoethylamino) ethanol	Positive	Positive	Positive	Rat - Male, Female	Oral	-	OECD 421

**Conclusion/Summary** : Suspected of damaging fertility or the unborn child.

**Teratogenicity** 

**Conclusion/Summary** : Not available.

#### Specific target organ toxicity (single exposure)

Not available.

#### Specific target organ toxicity (repeated exposure)

Product/ingredient name	Category	Route of exposure	Target organs
2-piperazin-1-ylethylamine	Category 1	inhalation	respiratory tract

#### Aspiration hazard

Not available.

# Information on likely routes : Not available. of exposure

Potential acute health effects

Eye contact	: Causes serious eye damage.
Inhalation	: No known significant effects or critical hazards.
Skin contact	: Causes severe burns. Toxic in contact with skin. May cause an allergic skin reaction.
Ingestion	: Harmful if swallowed.

#### Symptoms related to the physical, chemical and toxicological characteristics

Eye contact	: Adverse symptoms may include the following: pain watering redness
Inhalation	: No specific data.
Skin contact	Adverse symptoms may include the following: pain or irritation redness blistering may occur
Ingestion	Adverse symptoms may include the following: stomach pains reduced foetal weight increase in foetal deaths skeletal malformations

Delayed and immediate effects as well as chronic effects from short and long-term exposure					
<u>Short term exposure</u>					
Potential immediate effects	: Not available.				
Potential delayed effects	: Not available.				
Long term exposure					

# **SECTION 11: Toxicological information**

Potential immediate effects : Not available.

## Potential delayed effects : Not available.

#### Potential chronic health effects

Product/ingredient name	Result	Species	Dose	Exposure	Remarks
2-piperazin- 1-ylethylamine	Sub-chronic NOAEL Oral [OECD 422]	Rat - Male	152 mg/kg	-	-
	Sub-chronic NOEL Dermal [OECD 410]	Rat - Male, Female	1000 mg/kg	-	-
	Sub-chronic NOEL Inhalation Vapour [OECD 413]	Rat - Male, Female	53.5 mg/m³	90 days	-
2-(2-aminoethylamino) ethanol	Sub-acute NOAEL Dermal [OECD 410]	Rat - Male, Female	1000 mg/kg	4 weeks; 5 days per week	-
	Sub-acute NOEL Oral [OECD 407]	Rat - Male, Female	60 mg/kg	28 days	-
Conclusion/Summary	: Causes damage to	o organs throu	gh prolonged	or repeated ex	posure.

Conclusion/Summary	· Causes damage to organs through profonged of repeated exposure.
General	<ul> <li>Causes damage to organs through prolonged or repeated exposure. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.</li> </ul>
Carcinogenicity	: No known significant effects or critical hazards.
Mutagenicity	: No known significant effects or critical hazards.
Reproductive toxicity	: Suspected of damaging fertility or the unborn child. (oral)

#### 11.2 Information on other hazards

#### 11.2.1 Endocrine disrupting properties

No known significant effects or critical hazards (Human Health).

#### 11.2.2 Other information

Not available.

# **SECTION 12: Ecological information**

#### 12.1 Toxicity

Product/ingredient name	Result	Species	Exposure	Remarks
2-piperazin- 1-ylethylamine	Acute EC50 >1000 mg/l Fresh water [OECD 201]	Algae - Pseudokirchneriella subcapitata	72 hours	-
	Acute EC50 58 mg/l [OECD 202]	Daphnia - Daphnia magna	48 hours	-
	Acute LC50 2190 mg/l Fresh water	Fish - Pimephales promelas	96 hours	-
2-(2-aminoethylamino) ethanol	Acute EC50 920 mg/l Marine water [ISO 10253]	Algae	72 hours	-
	Acute EC50 190 mg/l Fresh water [OECD 202]	Daphnia	48 hours	-
	Acute LC50 640 mg/l Fresh water	Fish	96 hours	-
Conclusion/Summary	: Harmful to aquatic life v	vith long lasting effects.		

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# **SECTION 12: Ecological information**

## 12.2 Persistence and degradability

Product/ingredient name	Test	Result		Dose	Inoculum
2-piperazin-1-ylethylamine	OECD 301F	0 % - Not readily - 2	8 days	-	-
2-(2-aminoethylamino) ethanol	OECD 301F	>60 % - Readily - 28	3 days	-	-
Conclusion/Summary	: Not readily biod	legradable.			
Product/ingredient name	Aquatic half-life		Photolysis	6	Biodegradability
2-piperazin-1-ylethylamine	-		-		Not readily
2-(2-aminoethylamino) ethanol	-		-		Readily

#### 12.3 Bioaccumulative potential

Product/ingredient name	LogPow	BCF	Potential
2-piperazin-1-ylethylamine	-1.48	-	low
2-(2-aminoethylamino) ethanol	-1.46	2.1	low

12.4 Mobility in soil	
Soil/water partition coefficient (K _{oc} )	: Not available.
Mobility	: Not available.

#### 12.5 Results of PBT and vPvB assessment

Product/ingredient name	PBT	Р	В	Т	vPvB	vP	vB
2-piperazin-1-ylethylamine	No	Yes	No	Yes	No	No	No

#### 12.6 Endocrine disrupting properties

No known significant effects or critical hazards (Environment).

#### 12.7 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

<u>Product</u>	
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.
	The allocation of waste identity numbers/waste descriptions must be carried out according to the EWC, specific to the industry and process.
Hazardous waste	: The classification of the product may meet the criteria for a hazardous waste.
Packaging	
Methods of disposal	: The generation of waste should be avoided or minimised wherever possible.
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# **SECTION 13: Disposal considerations**

#### Special precautions

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

# **SECTION 14: Transport information**

	ADR/RID	ADN	IMDG	ΙΑΤΑ
14.1 UN number or ID number	UN2815	UN2815	UN2815	UN2815
14.2 UN proper shipping name	N- AMINOETHYLPIPERAZINE	N- AMINOETHYLPIPERAZINE	N- AMINOETHYLPIPERAZINE	N- Aminoethylpiperazine
14.3 Transport hazard class(es)	8 (6.1)	8 (6.1)	8 (6.1)	8 (6.1)
Label				
14.4 Packing group	Ш	Ш	Ш	Ш
14.5 Environmental hazards	No.	Yes.	Marine Pollutant: No	No.
Additional information       Image: Hazard identification number 86         ADR/RID       : Hazard identification number 86         Limited quantity 5 L       Tunnel code (E)         ADN       : The product is only regulated as an environmentally hazardous substance when transported in tank vessels.         IATA       : Quantity limitation Passenger and Cargo Aircraft: 5 L. Packaging instructions: 852. Cargo Aircraft Only: 60 L. Packaging instructions: 856. Limited Quantities - Passenger Aircraft: 1 L. Packaging instructions: Y841. Special provisions A803				
14.6 Special precautior user	<b>ons for</b> : <b>Transport within user's premises:</b> 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 Maritime transport bulk according to IMO instruments	4.7 Maritime transport in ulk according to IMO       Proper shipping name       : N-Aminoethylpiperazine         struments       : Liquid bulk cargoes:         Ship type: 3       Ship type: 3			

# **SECTION 15: Regulatory information**

#### 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture <u>EU Regulation (EC) No. 1907/2006 (REACH)</u>

#### Annex XIV - List of substances subject to authorisation

#### <u>Annex XIV</u>

None of the components are listed.

#### Substances of very high concern

None of the components are listed.

# Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

Country	Name	Restriction
EU	2-(2-aminoethylamino)ethanol	30
GB	2-(2-aminoethylamino)ethanol	30

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# **SECTION 15: Regulatory information**

Label: Not applicable.

#### **Other EU regulations**

#### Ozone depleting substances (1005/2009/EU)

Not listed.

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

Not listed.

#### Persistent Organic Pollutants Not listed.

Seveso Directive

This product is not controlled under the Seveso Directive.

#### National regulations

There are no known additional national regulations relevant to the SDS.

#### International regulations

#### Chemical Weapon Convention List Schedules I, II & III Chemicals Not listed.

#### Montreal Protocol

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	: All components are listed or exempted.
Canada	: All components are listed or exempted.
China	: All components are listed or exempted.
Eurasian Economic Union	: Russian Federation inventory: All components are listed or exempted.
Japan	: Japan inventory (CSCL):
	All components are listed or exempted.
New Zealand	: All components are listed or exempted.
Philippines	: All components are listed or exempted.
Republic of Korea	: All components are listed or exempted.
Taiwan	: All components are listed or exempted.
Thailand	: All components are listed or exempted.
Turkey	: All components are listed or exempted.
United States	: All components are active or exempted.
Viet Nam	: All components are 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
	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
Acute Tox. 4, H302	Regulatory data
Acute Tox. 3, H311	Expert judgment
Skin Corr. 1B, H314	Regulatory data
Eye Dam. 1, H318	Expert judgment
Skin Sens. 1, H317	Regulatory data
Repr. 2, H361 (oral)	Expert judgment
STOT RE 1, H372	Calculation method
Aquatic Chronic 3, H412	Regulatory data

#### Full text of abbreviated H statements

H302	Harmful if swallowed.
H311	Toxic in contact with skin.
H314	Causes severe skin burns and eye damage.
H317	May cause an allergic skin reaction.
H318	Causes serious eye damage.
H360	May damage fertility or the unborn child.
H361	Suspected of damaging fertility or the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs through prolonged or repeated
	exposure.
H412	Harmful to aquatic life with long lasting effects.

#### Full text of classifications [CLP/GHS]

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STOT RE 1		SPECIFIC TARGE	T ORGAN TOXICITY	REPEATED EXP	POSURE
Skin Sens. 1B		SKIN SENSITISAT	ION - Category 1B		
Skin Sens. 1		SKIN SENSITISAT	ION - Category 1	-	
Skin Corr. 1B		SKIN CORROSIO	N/IRRITATION - Categ	ory 1B	
Repr. 2		REPRODUCTIVE	TOXICITY - Category	2	
Repr. 1B		REPRODUCTIVE	TOXICITY - Category	1B	
Lact.		REPRODUCTIVE	TOXICITY - Effects on	or via lactation	
Eye Dam. 1		SERIOUS EYE DA	MAGE/EYE IRRITATIO	DN - Category 1	
Aquatic Chronic 3		LONG-TERM (CH	RONIC) AQUATIC HA	ZARD - Category	3
Acute Tox. 4		ACUTE TOXICITY	' - Category 4		
Acute Tox. 3		ACUTE TOXICITY	' - Category 3		

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N-Aminoethylpiperazine, AEP

SECTION 16: Othe	er information		
		- Category 1	
Date of printing	: 07/12/2022		
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#### Version <u>Notice to reader</u>

Date of previous issue

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.



Professional

#### Annex to the extended Safety Data Sheet (eSDS)

#### Identification of the substance or mixture **Product definition** : Mono-constituent substance Product name : N-Aminoethylpiperazine, AEP Section 1 - Title Short title of the exposure : Widespread use by professional workers; Adhesives, sealants (PC01). scenario List of use descriptors : Identified use name: ES04: Professional Use in Epoxy/PU Curing - Professional: PC01; PROC01, PROC05, PROC06, PROC08a, PROC10, PROC11, PROC19, PROC28; ERC08b, ERC08e. Process Category: PROC01, PROC05, PROC06, PROC08a, PROC10, PROC11, PROC19, PROC28 Subsequent service life relevant for that use: No. Environmental Release Category: ERC08b, ERC08e Market sector by type of chemical product: PC01 : Widespread use of reactive processing aid (no inclusion into or onto article, Environmental contributing scenarios indoor) - ERC08b Widespread use of reactive processing aid (no inclusion into or onto article, outdoor) - ERC08e **Health Contributing** : Storage - PROC01 Mixing operations - PROC05 scenarios Curing - PROC06 Material transfers; Non-dedicated facility - PROC08a Professional application of coatings and inks; Rolling, Brushing - PROC10 Professional application of coatings and inks; Spraying - PROC11 Manual activities involving hand contact - PROC19 Equipment cleaning and maintenance - PROC28 Number of the ES : 04 Additional information : Information concerning technical function: Intermediate (precursor).

#### Section 2 - Exposure controls

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Contributing scenario control inclusion into or onto article,	llin inc	g environmental exposure for 1: Widespread use of reactive processing aid (no loor)
Amounts used	:	Daily local widespread use amount: ≤0.00275 tonnes/day.
Other conditions affecting environmental exposure	:	Indoor and outdoor use.
		Release factor after on-site risk management: water: 2% (ERC08b, ERC08e). Local release rate: 0.055 kg/day. air: 0.1% (ERC08b, ERC08e). Soil: 1% (ERC08e).
Technical conditions and measures at process level (source) to prevent release	:	Process with efficient use of raw materials. Automation in raw materials handling: Manual. Equipment cleaned with water, washing disposed of with wastewater. Upon curing, substances are included into matrix without intended release to the environment.
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least: 0.031%).

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N-Aminoethylpiperazine, AEP	)	Exposure Scenario: 04Widespread use by professional workers; Adhesives, sealants (PC01).
Conditions and measures related to external treatment of waste for disposal	:	Disposal should be in accordance with applicable regional, national and local laws and regulations. This product should be treated as a hazardous waste according to EC Directive 2008/98/EC. Prevent entry into sewers, water courses, basements or confined areas. Equipment cleaned with organic solvent, washings are collected and disposed of as solvent waste.
Contributing scenario control inclusion into or onto article,	llin ou	g environmental exposure for 2: Widespread use of reactive processing aid (no tdoor)
Amounts used	:	Daily local widespread use amount: ≤0.00275 tonnes/day.
Other conditions affecting environmental exposure	:	Indoor and outdoor use. Release factor after on-site risk management: water: 2% (ERC08b, ERC08e).
		Local release rate: 0.055 kg/day. air: 0.1% (ERC08b, ERC08e). Soil: 1% (ERC08e).
Technical conditions and measures at process level (source) to prevent release	:	Process with efficient use of raw materials. Automation in raw materials handling: Manual. Equipment cleaned with water, washing disposed of with wastewater. Upon curing, substances are included into matrix without intended release to the environment.
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least: 0.031%).
Conditions and measures related to external treatment of waste for disposal	:	Disposal should be in accordance with applicable regional, national and local laws and regulations. This product should be treated as a hazardous waste according to EC Directive 2008/98/EC. Prevent entry into sewers, water courses, basements or confined areas. Equipment cleaned with organic solvent, washings are collected and disposed of as solvent waste.
Contributing scenario control	lin	g worker exposure for: All Contributing scenarios
Product characteristics	:	Liquid with low viscosity. Vapour pressure (20°C): 5.255 Pa.
Other conditions affecting workers exposure	:	Indoor use.
Organisational measures to prevent/limit releases, dispersion and exposure	:	Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin
		contamination immediately. Provide basic employee training to prevent/minimise exposures and to report any skin problems that may develop. Avoid direct contact with the substance/mixture/product by establishing organisational measures. Avoid splashing.
		Avoid contact with contaminated tools and objects. Regular cleaning of equipment. Regular cleaning of work area. Supervision in place to check that the risk management measures in place are being used correctly and operational conditions followed. Training for staff on good practice. Good standard of personal hygiene.
Conditions and measures rela	ate	d to personal protection, hygiene and health evaluation
Personal protection	:	Use suitable eye protection. Wear suitable gloves tested to EN374.

N-Aminoethylpiperazine, AEP	)	Exposure Scenario: 04	Widespread use by professional workers; Adhesives, sealants (PC01).
Contributing scenario control	lin	g worker exposure for 3: Stor	age
Product characteristics	:	Weight fraction of substance in	the article: 1.
Concentration of substance in mixture or article	:	Covers percentage substance i	n the product up to 100%.
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 Exposure period, Distance of w	hours. orker from source > 1 m: 480 minutes.
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C. Room size: Any. Activities with open liquid surface surfaces (no aerosol formation) Open surface: > 3 m ³ .	es or open reservoirs - activity with undisturbed
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored. Demonstrable and effective how Containment - high. Effectivene	d or the integrity of that enclosure is not regularly usekeeping practices are in place. ss of containment: 99.9%.
Technical conditions and measures to control	:	Occupational Health and Safety Store substance within a closed	/ Management System: Basic. svstem.
dispersion from source towards the worker		Assumes a good basic standard Provide a basic standard of ger Only good natural ventilation. (A	d of occupational hygiene is implemented. eral ventilation (1 to 3 air changes per hour). ART)
Contributing scenario control	lin	g worker exposure for 4: Mixi	ng operations
Product characteristics	:	Weight fraction of substance in	the article: 1.
Concentration of substance in mixture or article	:	Covers percentage substance i	n the product up to 100%.
Frequency and duration of use/exposure	:	Covers exposure up to 1 hour. Exposure period, Distance of w Non-exposure period: 420 minu	orker from source < 1 m: 60 minutes. tes.
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C. Room size: Any. Activities with open liquid surfac Open surface: 0.1 - 0.3 m ² .	es or open reservoirs - activity with agitated surfaces.
Technical conditions and measures at process level	:	The process is not fully enclose monitored.	d or the integrity of that enclosure is not regularly
(source) to prevent release Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Assumes a good basic standard Provide a basic standard of ger Only good natural ventilation. (A Local exhaust ventilation: Inhala Ensure fixed capturing hood is a	Jsekeeping practices are in place. / Management System: Basic. d of occupational hygiene is implemented. leral ventilation (1 to 3 air changes per hour). ART) ation - minimum efficiency of 90%. Jsed. Efficiency of at least 90%.
Conditions and measures rela	ate	d to personal protection, hygi	ene and health evaluation
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves employee training. Dermal - mi	(tested to EN374) in combination with 'basic' nimum efficiency of 90%.
Contributing scenario control	lin	g worker exposure for 5: Cur	ng
Product characteristics	:	Weight fraction of substance in	the article: 0.2.
Concentration of substance in mixture or article	:	Covers percentage substance i	n the product up to 20%.
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 Exposure period, Distance of w	hours. orker from source > 1 m: 480 minutes.
Other conditions affecting workers exposure	:	Operating temperature: ≤60°C. Room size: 300 m ³ . Handling of contaminated object Activities with treated/contamination Contamination 10 - 90% of surf	cts. ated objects (Surfaces 1 - 3 m²). ace.
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N-Aminoethylpiperazine, AEP	)	Exposure Scenario: 04	Widespread use by pro Adhesives, sealants (F	ofession PC01).	al wo	rkers;	
Technical conditions and	:	The process is not fully enclose	d or the integrity of that e	enclosure	e is not	regular	ſy
(source) to prevent release		Demonstrable and effective hou Containment - high. Effectivene	sekeeping practices are ss of containment: 99.9%	in place. %.			
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Handle substance within a close Assumes a good basic standard Provide a good standard of gen hour). >3 ach (air changes per hour). Local exhaust ventilation: Inhala	Management System: E ed system. I of occupational hygiene eral ventilation (not less <i>ART</i> ) tion - minimum efficienc	3asic. e is imple than 3 to y of 50%	mente 5 air c	ed. changes	sper
Conditions and measures rela	ate	d to personal protection, hygie	ene and health evaluati	on			
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves employee training. Dermal - min	(tested to EN374) in cor nimum efficiency of 90%	mbination	ı with '	basic'	
Contributing scenario control	lin	g worker exposure for 6: Mate	rial transfers; Non-dec	licated fa	acility		
Product characteristics	:	Weight fraction of substance in	the article: 1.				
Concentration of substance in mixture or article	:	Covers percentage substance in	n the product up to 100%	<b>b</b> .			
Frequency and duration of use/exposure	:	Covers exposure up to 1 hour. Exposure period, Distance of we Non-exposure period: 420 minu	orker from source < 1 m: tes.	: 60 minu	tes.		
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C. Room size: Any. Transfer of liquid products - fall Splash loading.	ng liquids.				
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored. Demonstrable and effective how Containment: Open process. Transfer of liquid products - fall	d or the integrity of that e isekeeping practices are ng liquids: 1 - 10 L/min.	enclosure in place.	e is not	t regular	ſly
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Assumes a good basic standard Provide a basic standard of gen Only good natural ventilation. (A Local exhaust ventilation: Inhala Ensure fixed capturing hood is u	Management System: E l of occupational hygiene eral ventilation (1 to 3 ai <i>IRT</i> ) tion - minimum efficienc used. Efficiency of at leas	Basic. e is imple r changes y of 90% st 90%.	emente s per l	ed. nour).	
Conditions and measures rela	ate	d to personal protection, hygi	ene and health evaluati	on			
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves employee training. Dermal - min	(tested to EN374) in cor imum efficiency of 90%	mbination	ı with '	basic'	
Contributing scenario control Brushing	lin	g worker exposure for 7: Prof	essional application of	coating	s and	inks; R	olling,
Product characteristics	:	Weight fraction of substance in	the article: 0.2.				
Concentration of substance in mixture or article	:	Covers percentage substance in	n the product up to 20%.				
Frequency and duration of use/exposure	:	Covers exposure up to 4 hours. Exposure period, Distance of we Non-exposure period: 240 minut	orker from source < 1 m: tes.	: 240 min	utes.		
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C. Room size: Any. Spreading of liquid products. Spreading of liquids at surfaces	or work pieces 1 - 3 m ²	/hour.			
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored. Demonstrable and effective hou No barriers or screens: Efficience	d or the integrity of that e isekeeping practices are cy of at least 80%.	enclosure in place.	e is not	regular	ſly
Date of issue/Date of revision		: 22/11/2022		Version	:3	/ en	21/66

N-Aminoethylpiperazine, AEF	2	Exposure Scenario: 04	Widespread use by profes Adhesives, sealants (PC0	ssional workers; )1).
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Saf Assumes a good basic stand Provide a basic standard of g Only good natural ventilation Local exhaust ventilation: Inh	ety Management System: Basi ard of occupational hygiene is leneral ventilation (1 to 3 air ch . ( <i>ART</i> ) alation - minimum efficiency of	ic. implemented. ianges per hour). f 90%.
Conditions and moasures rol	ata	Ensure that the activity takes	place in a downward laminar f	low booth. ( <i>ART</i> )
Personal protection	ale	l to personal protection, ny	giene and nearth evaluation	
	•	Wear chemical-resistant glov employee training. Dermal - Wear suitable respiratory pro	res (tested to EN374) in combin minimum efficiency of 90%. tection. Inhalation - minimum e	nation with 'basic' efficiency of 90%.
Contributing scenario contro Spraying	llin	g worker exposure for 8: P	rofessional application of co	atings and inks;
Product characteristics	:	Weight fraction of substance	in the article: 0.2.	
Concentration of substance in mixture or article	:	Covers percentage substanc	e in the product up to 20%.	
Frequency and duration of use/exposure	:	Covers exposure up to 2 hou Exposure period, Distance of Non-exposure period: 360 m	rs. worker from source < 1 m: 12 inutes.	:0 minutes.
Other conditions affecting workers exposure	:	Operating temperature: ≤20° Room size: Any. Surface spraying of liquids. Moderate application rate (0. Spraving with po or low comr	C. 3 - 3 I/minute). pressed air use	
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclo monitored. Demonstrable and effective h	nousekeeping practices are in p	losure is not regularly place.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Saf Provide down-flow spray room with independent clean air su under positive pressure and v 97.5%. Assumes a good basic stand Provide a basic standard of g Only good natural ventilation	ety Management System: Basi n. Ensure that worker is in a se pply. Apply within a vented cat with a protection factor of >40. ard of occupational hygiene is general ventilation (1 to 3 air ch (ART)	ic. eparated (control) room b supplied with filtered air Efficiency of at least implemented. hanges per hour).
Conditions and measures rela	ate	d to personal protection, hy	giene and health evaluation	
Personal protection	:	Use suitable eye protection. Wear chemical-resistant glov employee training. Dermal -	res (tested to EN374) in combin minimum efficiency of 90%.	nation with 'basic'
Contributing scenario contro	llin	g worker exposure for  9: M	anual activities involving har	nd contact
Product characteristics	:	Weight fraction of substance	in the article: 1.	
Concentration of substance in mixture or article	:	Covers percentage substanc	e in the product up to 100%.	
Frequency and duration of use/exposure	:	Covers exposure up to 1 hou Exposure period, Distance of Non-exposure period: 420 m	r. worker from source < 1 m: 60 inutes.	minutes.
Human factors not influenced by risk management	:	Body weight: 70 kg.		
Other conditions affecting workers exposure	:	Operating temperature: ≤20° Room size: Any. Activities with open liquid surf surfaces (no aerosol formatio Open surface: 0.1 - 0.3 m ² .	C. āces or open reservoirs - activ on).	rity with undisturbed
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclo monitored. Demonstrable and effective h	nousekeeping practices are in	losure is not regularly place.
Date of issue/Date of revision		: 22/11/2022	Vei	rsion : 3 / en 22/66

N-Aminoethylpiperazine, AEF	2	Exposure Scenario: 04	Widespread use by professional workers; Adhesives, sealants (PC01).
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safe Assumes a good basic standar Provide a basic standard of ge Only good natural ventilation. (	ty Management System: Basic. d of occupational hygiene is implemented. neral ventilation (1 to 3 air changes per hour). ART)
Conditions and measures relation	ate	d to personal protection, hyg	iene and health evaluation
Personal protection	:	Use suitable eye protection. Wear chemical-resistant glove employee training. Dermal - m	s (tested to EN374) in combination with 'basic' inimum efficiency of 90%.
Contributing scenario contro	llin	g worker exposure for 10: Ec	uipment cleaning and maintenance
Product characteristics	:	Weight fraction of substance in	the article: 1.
Concentration of substance in mixture or article	:	Covers percentage substance	in the product up to 100%.
Frequency and duration of use/exposure	:	Covers exposure up to 1 hour. Exposure period, Distance of v Non-exposure period: 420 min	vorker from source < 1 m: 60 minutes. utes.
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C Room size: Any. Handling of contaminated obje Activities with treated/contamin Contamination 10 - 90% of sur	ects. ated objects (Surfaces: 1 - 3 m²). face.
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclos monitored. Demonstrable and effective ho	ed or the integrity of that enclosure is not regularly pusekeeping practices are in place.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safe Assumes a good basic standar Provide a basic standard of ge Only good natural ventilation. (	ty Management System: Basic. Id of occupational hygiene is implemented. neral ventilation (1 to 3 air changes per hour). <i>ART</i> )
Conditions and measures relation	ate	d to personal protection, hyg	iene and health evaluation
Personal protection	:	Use suitable eye protection. Wear chemical-resistant glove employee training. Dermal - m	s (tested to EN374) in combination with 'basic' inimum efficiency of 90%.

# Section 3 - Exposure estimation and reference to its source

Exposure estimation and re (no inclusion into or onto ar	erence to its source - Environment: 1: Widespread use of reactive processing aid ticle, indoor)
Exposure assessment (environment):	: EUSES v2.1.2.
Exposure estimation	: Freshwater: 0.019 mg/l. Risk characterisation ratio (PEC/PNEC): 0.335.
	Freshwater sediment: 0.073 mg/kg dwt. Risk characterisation ratio (PEC/PNEC):< 0.01.
	Marine water: 0.00194 mg/l. Risk characterisation ratio (PEC/PNEC): 0.334.
	Marine water sediment: 0.00732 mg/kg dwt. Risk characterisation ratio (PEC/PNEC):< 0.01.
	Sewage Treatment Plant: 0.027 mg/l. Risk characterisation ratio (PEC/PNEC):< 0.01.
	Soil: 0.011 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.011.
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).

N-Aminoethylpiperazine, AEP	Exposure Scenario: 04
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Widespread use by professional workers; Adhesives, sealants (PC01).

Exposure estimation and reference (no inclusion into or onto article Exposure assessment : (environment): Exposure estimation :	nce to its source - Environment: 2: Widespread use of reactive processing aid e, outdoor) EUSES v2.1.2. Freshwater: 0.019 mg/l. Risk characterisation ratio (PEC/PNEC): 0.335. Freshwater sediment: 0.073 mg/kg dwt.
Exposure assessment : (environment): Exposure estimation :	EUSES v2.1.2. Freshwater: 0.019 mg/l. Risk characterisation ratio (PEC/PNEC): 0.335. Freshwater sediment: 0.073 mg/kg dwt.
Exposure estimation :	Freshwater: 0.019 mg/l. Risk characterisation ratio (PEC/PNEC): 0.335. Freshwater sediment: 0.073 mg/kg dwt.
	Freshwater sediment: 0.073 mg/kg dwt.
	Risk characterisation ratio (PEC/PNEC):< 0.01.
	Marine water: 0.00194 mg/l. Risk characterisation ratio (PEC/PNEC): 0.334.
	Marine water sediment: 0.00732 mg/kg dwt. Risk characterisation ratio (PEC/PNEC):< 0.01.
	Sewage Treatment Plant: 0.027 mg/l. Risk characterisation ratio (PEC/PNEC):< 0.01.
	Soil: 0.011 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.011.
Remark :	Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).
Exposure estimation and refere	nce to its source - Workers: 3: Storage
Exposure assessment : (human):	Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.
Exposure estimation :	<b>Worker - inhalative, long-term - local:</b> 0.000036 mg/m ³ . Risk characterisation ratio: <0.01.
	<b>Worker - dermal, long-term - systemic:</b> 0.034 mg/kg bw/day. Risk characterisation ratio: 0.01.
Remark :	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).
Exposure estimation and refere	nce to its source - Workers: 4: Mixing operations
Exposure assessment : (human):	Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.
Exposure estimation :	<b>Worker - inhalative, long-term - local:</b> 0.0077 mg/m³. Risk characterisation ratio: 0.513.
	<b>Worker - dermal, long-term - systemic:</b> 1.371 mg/kg bw/day. Risk characterisation ratio: 0.412.
Remark :	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).
Exposure estimation and refere	nce to its source - Workers: 5: Curing
Exposure assessment : (human):	Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.
Exposure estimation :	<b>Worker - inhalative, long-term - local:</b> 0.0091 mg/m³. Risk characterisation ratio: 0.607.
	<b>Worker - dermal, long-term - systemic:</b> 1.646 mg/kg bw/day. Risk characterisation ratio: 0.494.
Remark :	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

N-Aminoethylpiperazine, AEF	2	Exposure Scenario: 04	Widespread use by professional workers; Adhesives, sealants (PC01).
Exposure estimation and refe	erer	nce to its source - Workers: 6:	Material transfers; Non-dedicated facility
Exposure assessment (human):	:	Inhalation exposure: Used ART Dermal exposure: ECETOC TF	model. Version 1.5. RA worker v3.
Exposure estimation	:	<b>Worker - inhalative, long-tern</b> Risk characterisation ratio: 0.45	<b>ı - local:</b> 0.0068 mg/m³. 3.
		Worker - dermal, long-term - Risk characterisation ratio: 0.41	<b>systemic:</b> 1.371 mg/kg bw/day. 2.
Remark	:	Based on the applied RMMs the < 1).	e risk towards humans is sufficiently controlled (RCR
Exposure estimation and refe Rolling, Brushing	erer	nce to its source - Workers: 7:	Professional application of coatings and inks;
Exposure assessment (human):	:	Inhalation exposure: Used ART Dermal exposure: ECETOC TF	model. Version 1.5. A worker v3.
Exposure estimation	:	<b>Worker - inhalative, long-term</b> Risk characterisation ratio: 0.48	<b>n - local:</b> 0.0073 mg/m³. 77.
		Worker - dermal, long-term - Risk characterisation ratio: 0.49	<b>systemic:</b> 1.646 mg/kg bw/day. 4.
Remark	:	Based on the applied RMMs the < 1).	e risk towards humans is sufficiently controlled (RCR
Exposure estimation and refe	erer	nce to its source - Workers: 8:	Professional application of coatings and inks;
Exposure assessment (human):	:	Inhalation exposure: Used ART Dermal exposure: ECETOC TF	model. Version 1.5. RA worker v3 (Modified version).
Exposure estimation	:	<b>Worker - inhalative, long-tern</b> Risk characterisation ratio: 0.8.	<b>ו - local:</b> 0.012 mg/m³.
		Worker - dermal, long-term - Risk characterisation ratio: 0.48	<b>systemic:</b> 1.607 mg/kg bw/day. 3.
Remark	:	Based on the applied RMMs the < 1).	e risk towards humans is sufficiently controlled (RCR
Exposure estimation and refe	erer	nce to its source - Workers: 9:	Manual activities involving hand contact
Exposure assessment (human):	:	Inhalation exposure: Used ART Dermal exposure: Used Riskof	model. Version 1.5. derm model. Version 2.1.
Exposure estimation	:	<b>Worker - inhalative, long-tern</b> Risk characterisation ratio: 0.50	<b>n - local:</b> 0.0076 mg/m³. 17.
		Worker - dermal, long-term - Risk characterisation ratio: 0.68	<b>systemic:</b> 2.274 mg/kg bw/day. /3.
Remark	:	Based on the applied RMMs the < 1).	e risk towards humans is sufficiently controlled (RCR
Exposure estimation and refe	erer	nce to its source - Workers: 10	): Equipment cleaning and maintenance
Exposure assessment (human):	:	Inhalation exposure: Used ART Dermal exposure: ECETOC TF	model. Version 1.5. RA worker v3.
Exposure estimation	:	Worker - inhalative, long-tern Risk characterisation ratio: 0.50	<b>n - local:</b> 0.0076 mg/m³. 17.
		<b>Worker - dermal, long-term -</b> Risk characterisation ratio: 0.41 Remarks: Exposure Estimation	<b>systemic:</b> 1.371 mg/kg bw/day. 2. : PROC08a
Remark	:	Based on the applied RMMs the < 1).	e risk towards humans is sufficiently controlled (RCR

Widespread use by professional workers; Adhesives, sealants (PC01).

#### 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.



Industrial

# Annex to the extended Safety Data Sheet (eSDS)

Identification of the sub	sta	ance or mixture
Product definition	:	Mono-constituent substance
Product name	:	N-Aminoethylpiperazine, AEP
Section 1 - Title		
Short title of the exposure scenario	:	Use at industrial sites.
List of use descriptors	:	Identified use name: ES03: Industrial Use in Epoxy/PU Curing Industrial - Industrial: PROC01, PROC02, PROC03, PROC07, PROC08b, PROC10, PROC15, PROC28; ERC06d. Process Category: PROC01, PROC02, PROC03, PROC07, PROC08b, PROC10, PROC15, PROC28 Subsequent service life relevant for that use: No. Environmental Release Category: ERC06d
Environmental contributing scenarios	:	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article) - ERC06d
Health Contributing scenarios	:	Storage - PROC01 General exposures (closed systems); Continuous process; With sample collection - PROC02 General exposures; Use in contained batch processes; With sample collection - PROC03 Industrial application of coatings and inks; Spraying; Closed systems - PROC07 Bulk transfers; Dedicated facility - PROC08b Industrial application of coatings and inks; Rolling, Brushing; Closed systems - PROC10 Laboratory activities - PROC15 Equipment cleaning and maintenance - PROC28
Number of the ES	:	03
Additional information	:	Information concerning technical function: Intermediate (precursor).

# Section 2 - Exposure controls

Contributing scenario control polymerisation processes at i	ling environmental exposure for 1: Use of reactive process regulators in ndustrial site (inclusion or not into/onto article)
Amounts used	: Daily amount per site: ≤15 tonnes/day. Annual amount per site: ≤5000 tonnes/year.
Other conditions affecting environmental exposure	: Receiving surface water flow: ≥18000 m³/d.
	Release factor after on-site risk management: water: 0.005% (ERC06d). Local release rate: 0.75 kg/day. air: 35% (ERC06d). Local release rate: 5250 kg/day. Soil: 0.025% (ERC06d).
Conditions and measures related to sewage treatment plant	<ul> <li>Sewage Treatment Plant: Yes. (Efficiency of at least: 0.031%).</li> <li>Discharge rate: ≥2000 m³/d.</li> <li>Application of the STP sludge on agricultural soil: Yes.</li> </ul>
Conditions and measures related to external treatment of waste for disposal	<ul> <li>Disposal should be in accordance with applicable regional, national and local laws and regulations.</li> <li>This product should be treated as a hazardous waste according to EC Directive 2008/98/EC.</li> <li>Prevent entry into sewers, water courses, basements or confined areas.</li> </ul>

N-Aminoethylpiperazine, AEF	•	Exposure Scenario: 03	Use at industrial sites.				
Contributing scenario controlling worker exposure for: All Contributing scenarios							
Product characteristics	:	Liquid with low viscosity. Vapour pressure (20°C): 5.255	Pa.				
Other conditions affecting workers exposure	:	Indoor use.					
workers exposure Organisational measures to prevent/limit releases, dispersion and exposure	:	<ul> <li>Avoid all skin contact with product, clean up contamination/spills as soon as they occur.</li> <li>Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately.</li> <li>Provide basic employee training to prevent/minimise exposures and to report any skin problems that may develop.</li> <li>Avoid direct contact with the substance/mixture/product by establishing organisational measures.</li> <li>Avoid splashing.</li> <li>Avoid contact with contaminated tools and objects.</li> <li>Regular cleaning of equipment.</li> <li>Regular cleaning of work area.</li> <li>Supervision in place to check that the risk management measures in place are being used correctly and operational conditions followed.</li> <li>Training for staff on good practice.</li> <li>Good standard of personal hygiene.</li> </ul>					
Personal protection	:	Use suitable eye protection. Wear suitable gloves tested to	EN374.				
Contributing scenario contro	llir	g worker exposure for 2: Stor	rage				
Product characteristics	:	Weight fraction of substance in	the article: 1.				
Concentration of substance in mixture or article	:	Covers percentage substance i	n the product up to 100%.				
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 Exposure period, Distance of w	hours. orker from source > 1 m: 480 minutes.				
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C. Room size: Any. Activities with open liquid surfaces or open reservoirs - activity with undisturbed surfaces (no aerosol formation). Open surface: > 3 m ³ .					
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclosed or the integrity of that enclosure is not regularly monitored. Demonstrable and effective housekeeping practices are in place. Containment - high. Effectiveness of containment: 99.9%					
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safet Store substance within a closed Assumes a good basic standar Provide a basic standard of ger Only good natural ventilation. ( <i>i</i>	y Management System: Advanced. d system. d of occupational hygiene is implemented. neral ventilation (1 to 3 air changes per hour). ART)				
Contributing scenario controlling worker exposure for 3: General exposures (closed systems); Continuous process; With sample collection							
Product characteristics	:	Weight fraction of substance in	the article: 1.				
Concentration of substance in mixture or article	:	Covers percentage substance i	n the product up to 100%.				
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 Activity/Process 1: Exposure per minutes. Activity/Process 2: Exposure per minutes. Activity/Process 3: Exposure per minutes.	hours. riod, Distance of worker from source < 1 m: 10 riod, Distance of worker from source < 1 m: 50 riod, Distance of worker from source > 1 m: 420				

N-Aminoethylpiperazine, AEF	2	Exposure Scenario: 03	Use at industrial sites.		
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C Room size: 1000 m³.	;.		
		Activity/Process 1: Transfer of - Splash loading.	liquid products - falling liquids:		
		Activity/Process 2: Handling of - Activities with treated/contam - Contamination 10 - 90% of s	⁻ contaminated objects: inated objects (Surfaces: 1 - 3 m²). urface.		
		Activity/Process 3: Activities wir agitated surfaces: - Open surface: > 3 m³.	th open liquid surfaces or open reservoirs - activity with		
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclos monitored.	ed or the integrity of that enclosure is not regularly		
		Activity/Process 1: Transfer of liquid products - falling liquids: - General housekeeping practices are in place. - Transfer of liquid products - falling liquids: < 0.1 L/min. - Handling that reduces contact between product and adjacent air.			
		Activity/Process 2: Handling of - Demonstrable and effective I	[:] contaminated objects: housekeeping practices are in place.		
		Activity/Process 3: Activities wir agitated surfaces: - Demonstrable and effective I - Containment - high. Effective	th open liquid surfaces or open reservoirs - activity with housekeeping practices are in place. eness of containment: 99.9%.		
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safe Handle substance within a clos Assumes a good basic standa Provide a basic standard of ge Only good natural ventilation.	ty Management System: Advanced. sed system. rd of occupational hygiene is implemented. eneral ventilation (1 to 3 air changes per hour). ( <i>ART</i> )		
Conditions and measures related to personal protection, hygiene and health evaluation					
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90%.			
Contributing scenario contro processes; With sample colle	llin ecti	g worker exposure for 4: Ge on	neral exposures; Use in contained batch		
Product characteristics	:	Weight fraction of substance in	n the article: 1.		
Concentration of substance in mixture or article	:	Covers percentage substance	in the product up to 100%.		
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 Activity/Process 1: Exposure printes	3 hours. eriod, Distance of worker from source < 1 m: 20		
		Activity/Process 2: Exposure printers.	eriod, Distance of worker from source < 1 m: 60		
		Activity/Process 3: Exposure p minutes. Activity/Process 4: Exposure p	eriod, Distance of worker from source < 1 m: 20		
Other conditions affecting workers exposure	:	minutes. Operating temperature: ≤20°C Room size: 1000 m³.	).		
	Activity/Process 1: Transfer of liquid products - falling liquids: - Splash loading.				
		Activity/Process 2 / 4: Handling - Activities with treated/contam - Contamination 10 - 90% of s	g of contaminated objects: inated objects (Surfaces: 1 - 3 m²). urface.		
		Activity/Process 3: Activities wir agitated surfaces:	th open liquid surfaces or open reservoirs - activity with		
Date of issue/Date of revision		: 22/11/2022	Version : 3 / en 29/66		

N-Aminoethylpiperazine, AEP	2	Exposure Scenario: 03	Use at industrial sites.			
		- Open surface: > 3 m ³ .				
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclo monitored.	sed or the integrity of that e	nclosure is not	regularly	
		Activity/Process 1: Transfer of liquid products - falling liquids:				
		- General housekeeping prac	tices are in place.			
		- Handling that reduces contact between product and adjacent air.				
		Activity/Process 2 / 4: Handlir - Demonstrable and effective	g of contaminated objects: housekeeping practices ar	e in place.		
		Activity/Process 3: Activities with open liquid surfaces or open reservoirs - ac agitated surfaces: - Demonstrable and effective housekeeping practices are in place.				
		- Containment - high. Effectiv	eness of containment: 99.9	1%.		
Technical conditions and measures to control	:	Occupational Health and Saf Handle substance within a clo	ety Management System: A osed system.	dvanced.		
dispersion from source towards the worker		Assumes a good basic standard of occupational hygiene is implemented. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Only good natural ventilation. ( <i>ART</i> )				
Conditions and measures rela	ate	d to personal protection, hy	giene and health evaluation	on		
Personal protection	:	Use suitable eye protection. Wear chemical-resistant glov employee training. Dermal - r	es (tested to EN374) in con ninimum efficiency of 90%.	nbination with '	basic'	
Contributing scenario control Closed systems	llin	g worker exposure for 5: In	dustrial application of coa	atings and ink	s; Spraying;	
Product characteristics	:	Weight fraction of substance	in the article: 0.2.			
Concentration of substance in mixture or article	:	Covers percentage substance	e in the product up to 20%.			
Frequency and duration of use/exposure	:	Covers daily exposures up to Activity/Process 1: Exposure   minutes. Activity/Process 2: Exposure   minutes	8 hours. period, Distance of worker f period, Distance of worker f	from source > ⁻	1 m: 120 1 m: 360	
Other conditions affecting workers exposure	:	Operating temperature: ≤60° Room size: 3000 m ³ .	С.			
		Activity/Process 1: Surface sp - High application rate (> 3 I/r	praying of liquids.: ninute).			
		<ul> <li>Ensure that direction of app</li> <li>Spraying with no or low com</li> </ul>	lication is only horizontal or pressed air use.	downward.		
		Activity/Process 2: Handling c - Activities with treated/contar - Contamination 10 - 90% of s	of contaminated objects: ninated objects (Surfaces: surface.	1 - 3 m²).		
Technical conditions and measures at process level	:	Activity/Process 1: Surface sp contaminated objects:	praying of liquids. / Activity/P	rocess 2: Han	dling of	
(source) to prevent release		- The process is not fully encl monitored.	osed or the integrity of that	enclosure is no	ot regularly	
		<ul> <li>Demonstrable and effective</li> <li>Containment - high. Effective</li> </ul>	housekeeping practices ar eness of containment: 99.9	e in place. %.		
Technical conditions and	:	Occupational Health and Saf	ety Management System: A	Advanced.		
measures to control		Handle substance within a clo	osed system.		ام	
towards the worker		Provide a good standard of g	eneral ventilation (not less t	than 3 to 5 air (	banges per	
-		hour).				
		>3 ach (air changes per hour Local exhaust ventilation: Inh-	). ( <i>ART</i> ) alation - minimum efficiency	v of 50%		
		Localised controls (secondar	y): Provide extract ventilatio	n to points whe	re emissions	
Conditions and measures rela	ate	occur. ⊨tticiency of at least ≥ d to personal protection, hy	ວບ%. (ART) giene and health evaluatio	on		
		, ,				
Date of issue/Date of revision		: 22/11/2022		Version : 3	/ en 30/6	

N-Aminoethylpiperazine, AEP	,	Exposure Scenario: 03	Use at industrial sites.
Personal protection	:	Use suitable eye protection. Wear chemical-resistant glove employee training. Dermal - n	es (tested to EN374) in combination with 'basic' ninimum efficiency of 90%.
Contributing scenario control	llin	g worker exposure for 6: Bu	Ik transfers; Dedicated facility
Product characteristics	:	Weight fraction of substance in	n the article: 1.
Concentration of substance in mixture or article	:	Covers percentage substance	in the product up to 100%.
Frequency and duration of use/exposure	:	Covers exposure up to 4 hours Activity/Process 1: Exposure p minutes. Activity/Process 2: Exposure p minutes. Activity/Process 3: Exposure p minutes. Non-exposure period: 240 mir	s. eriod, Distance of worker from source < 1 m: 20 eriod, Distance of worker from source > 1 m: 200 eriod, Distance of worker from source < 1 m: 20 nutes.
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C Room size: 1000 m³.	›.
		Activity/Process 1: Transfer of - Splash loading.	liquid products - falling liquids:
		Activity/Process 3: Handling of - Activities with treated/contam - Contamination 10 - 90% of s	i contaminated objects: iinated objects (Surfaces: 1 - 3 m²). urface.
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored.	ed or the integrity of that enclosure is not regularly
		Activity/Process 1: Transfer of - General housekeeping pract - Transfer of liquid products - - Handling that reduces contact	liquid products - falling liquids: ices are in place. falling liquids: < 0.1 L/min. ct between product and adjacent air.
		Activity/Process 2: Transfer of - Demonstrable and effective - Transfer of liquid products -	liquid products - Bottom loading: housekeeping practices are in place. Bottom loading: >1000 L/min.
		- Demonstrable and effective	housekeeping practices are in place.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Sate Assumes a good basic standa Provide a basic standard of ge Only good natural ventilation.	ty Management System: Advanced. Ind of occupational hygiene is implemented. Ineral ventilation (1 to 3 air changes per hour). ( <i>ART</i> )
Conditions and measures rela	ate	d to personal protection, hyg	jiene and health evaluation
Personal protection	:	Use suitable eye protection. Wear chemical-resistant glove employee training. Dermal - m	es (tested to EN374) in combination with 'basic' ninimum efficiency of 90%.
Contributing scenario control Brushing: Closed systems	llin	g worker exposure for 7: Ind	lustrial application of coatings and inks; Rolling,
Product characteristics	:	Weight fraction of substance i	n the article: 0.2.
Concentration of substance in mixture or article	:	Covers percentage substance	in the product up to 20%.
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 Activity/Process 1: Exposure p minutes. Activity/Process 2: Exposure p minutes.	3 hours. eriod, Distance of worker from source > 1 m: 120 eriod, Distance of worker from source > 1 m: 360

N-Aminoethylpiperazine, AEF	>	Exposure Scenario: 03	Use at industrial sites.	
Other conditions affecting workers exposure	:	Operating temperature: ≤60°C Room size: 3000 m³.		
		Activity/Process 1: Spreading of liquid products: - Spreading of liquids at surfaces or work pieces > 3 m²/hour.		
		Activity/Process 2: Handling of - Activities with treated/contam - Contamination 10 - 90% of su	contaminated objects: inated objects (Surfaces: > 3 m²). ırface.	
Technical conditions and measures at process level (source) to prevent release	:	<ul> <li>Activity/Process 1: Spreading of liquid products / Activity/Process 2: Handling of contaminated objects:</li> <li>The process is not fully enclosed or the integrity of that enclosure is not regularly monitored.</li> <li>Demonstrable and effective housekeeping practices are in place.</li> <li>Containment - high. Effectiveness of containment: 99.9%</li> </ul>		
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Management System: Advanced. Handle substance within a closed system. Assumes a good basic standard of occupational hygiene is implemented. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). >3 ach (air changes per hour). ( <i>ART</i> ) Local exhaust ventilation: Inhalation - minimum efficiency of 50%. Localised controls (secondary): Provide extract ventilation to points where emissions occur. Efficiency of at least ≥ 50%. ( <i>ART</i> )		
Conditions and measures rela	ate	d to personal protection, hyg	iene and health evaluation	
Personal protection	:	Use suitable eye protection. Wear chemical-resistant glove employee training. Dermal - m	s (tested to EN374) in combination with 'basic' inimum efficiency of 90%.	
Contributing scenario contro	llin	g worker exposure for 8: Lab	ooratory activities	
Product characteristics	:	Weight fraction of substance in	the article: 1.	
Concentration of substance in mixture or article	:	Covers percentage substance	in the product up to 100%.	
Frequency and duration of use/exposure	:	Covers exposure up to 1 hour. Exposure period, Distance of w Non-exposure period: 420 min	vorker from source < 1 m: 60 minutes. utes.	
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C Room size: Any. Transfer of liquid products - fal Splash loading.	ling liquids.	
Technical conditions and	:	The process is not fully enclose	ed or the integrity of that enclosure is not regularly	
measures at process level (source) to prevent release		General housekeeping practice Containment: Open process. Transfer of liquid products - fal	es are in place. ling liquids: < 0.1 L/min.	
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safet Assumes a good basic standar Provide a good standard of get hour). >3 ach (air changes per hour). Local exhaust ventilation: Inhal Handle in a fume cupboard. Ef	ty Management System: Advanced. rd of occupational hygiene is implemented. neral ventilation (not less than 3 to 5 air changes per ( <i>ART</i> ) ation - minimum efficiency of 95%. fficiency of at least 99%.	
Conditions and measures rela	ate	d to personal protection, hyg	iene and health evaluation	
Personal protection	:	Use suitable eye protection. Wear chemical-resistant glove employee training. Dermal - m	s (tested to EN374) in combination with 'basic' inimum efficiency of 90%.	

N-Aminoethylpiperazine, AEP		Exposure Scenario: 03	Use at industrial sites.
Contributing scenario control	lin	g worker exposure for 9: Equ	ipment cleaning and maintenance
Product characteristics	:	Weight fraction of substance in	the article: 1.
Concentration of substance in mixture or article	:	Covers percentage substance i	n the product up to 100%.
Frequency and duration of use/exposure	:	Covers exposure up to 2 hours Exposure period, Distance of w Non-exposure period: 360 minu	orker from source < 1 m: 120 minutes. ites.
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C. Room size: Any. Handling of contaminated obje Activities with treated/contamination Contamination 10 - 90% of surf	cts. ated objects (Surfaces: 1 - 3 m²). ace.
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored. Demonstrable and effective ho	ed or the integrity of that enclosure is not regularly usekeeping practices are in place.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safet Assumes a good basic standar Provide a basic standard of ger Only good natural ventilation. (A	y Management System: Advanced. d of occupational hygiene is implemented. neral ventilation (1 to 3 air changes per hour). ART)
Conditions and measures rela	ite	d to personal protection, hygi	ene and health evaluation
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves employee training. Dermal - mi	(tested to EN374) in combination with 'basic' nimum efficiency of 90%.

# Section 3 - Exposure estimation and reference to its source

Exposure estimation and r polymerisation processes	ference to its source - Environment: 1: Use of reactive process regulators in it industrial site (inclusion or not into/onto article)			
Exposure assessment : EUSES v2.1.2. (environment):				
Exposure estimation	: Freshwater: 0.054 mg/l. Risk characterisation ratio (PEC/PNEC): 0.934.			
	Freshwater sediment: 0.205 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01.			
	Marine water: 0.00541 mg/l. Risk characterisation ratio (PEC/PNEC): 0.933.			
	Marine water sediment: 0.02 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01.			
	Sewage Treatment Plant: 0.375 mg/l. Risk characterisation ratio (PEC/PNEC): <0.01.			
	Soil: 0.685 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.685.			
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).			
Exposure estimation and r	ference to its source - Workers: 2: Storage			
Exposure assessment (human):	: Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.			
Exposure estimation	: Worker - inhalative, long-term - local: 0.000036 mg/m ³ . Risk characterisation ratio: <0.01.			
	<b>Worker - dermal, long-term - systemic:</b> 0.034 mg/kg bw/day. Risk characterisation ratio: 0.01.			
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).			
Date of issue/Date of revision	: 22/11/2022 Version : 3 / en 33/			

N-Aminoethylpiperazine, AEI	Ρ	Exposure Scenario: 03	Use at industrial sites.		
Exposure estimation and reference to its source - Workers: 3: General exposures (closed systems); Continuous process; With sample collection					
Exposure assessment (human):	:	Inhalation exposure: Used ART Dermal exposure: ECETOC TF	model. Version 1.5. RA worker v3.		
Exposure estimation	:	<b>Worker - inhalative, long-tern</b> Risk characterisation ratio: 0.18	<b>Norker - inhalative, long-term - local:</b> 0.0027 mg/m³. Risk characterisation ratio: 0.18.		
		<b>Worker - dermal, long-term -</b> Risk characterisation ratio: 0.04	<b>systemic:</b> 0.137 mg/kg bw/day. 11.		
Remark	:	Based on the applied RMMs th < 1).	e risk towards humans is sufficiently controlled (RCR		
Exposure estimation and referencesses: With sample colle	ere ect	nce to its source - Workers: 4 ion	General exposures; Use in contained batch		
Exposure assessment (human):	:	Inhalation exposure: Used ART Dermal exposure: ECETOC TF	⁻ model. Version 1.5. RA worker ∨3.		
Exposure estimation	:	Worker - inhalative, long-tern Risk characterisation ratio: 0.25	<b>n - local:</b> 0.0038 mg/m³. 53.		
		Worker - dermal, long-term - Risk characterisation ratio: 0.02	<b>systemic:</b> 0.069 mg/kg bw/day. 21.		
Remark	:	Based on the applied RMMs th < 1).	e risk towards humans is sufficiently controlled (RCR		
Exposure estimation and refe	ere	nce to its source - Workers: 5	Industrial application of coatings and inks;		
Exposure assessment	:	Inhalation exposure: Used ART	model. Version 1.5.		
Exposure estimation	:	Worker - inhalative, long-tern Risk characterisation ratio: 0.32	<b>n - local:</b> 0.0049 mg/m³. 27.		
		<b>Worker - dermal, long-term -</b> Risk characterisation ratio: 0.02 Remarks: Exposure Estimation	<b>systemic:</b> 0.082 mg/kg bw/day. 25. : PROC02		
Remark	:	Based on the applied RMMs th < 1).	e risk towards humans is sufficiently controlled (RCR		
Exposure estimation and refe	ere	nce to its source - Workers: 6	Bulk transfers; Dedicated facility		
Exposure assessment (human):	:	Inhalation exposure: Used ART Dermal exposure: ECETOC TF	model. Version 1.5. RA worker v3.		
Exposure estimation	:	<b>Worker - inhalative, long-tern</b> Risk characterisation ratio: 0.22	<b>n - local:</b> 0.0034 mg/m³. 27.		
		<b>Worker - dermal, long-term -</b> Risk characterisation ratio: 0.47	<b>systemic:</b> 1.371 mg/kg bw/day. 12.		
Remark	:	Based on the applied RMMs th < 1).	e risk towards humans is sufficiently controlled (RCR		
Exposure estimation and refe Rolling, Brushing; Closed sy	ere ste	nce to its source - Workers: 7: ms	Industrial application of coatings and inks;		
Exposure assessment (human):	:	Inhalation exposure: Used ART	- model. Version 1.5. RA worker v3		
Exposure estimation	:	Worker - inhalative, long-tern Risk characterisation ratio: 0.29	<b>n - local:</b> 0.0044 mg/m³. 93.		
		Worker - dermal, long-term - Risk characterisation ratio: 0.02 Remarks: Exposure Estimation	<b>systemic:</b> 0.082 mg/kg bw/day. 25. : PROC02		
Remark	:	Based on the applied RMMs th < 1).	e risk towards humans is sufficiently controlled (RCR		
Date of issue/Date of revision		: 22/11/2022	Version : 3 / en 34/66		

N-Aminoethylpiperazine, AE	Ρ	Exposure Scenario: 03	Use at industrial sites.		
Exposure estimation and reference to its source - Workers: 8: Laboratory activities					
Exposure assessment (human):	:   [	nhalation exposure: Used A Dermal exposure: ECETOC	NRT model. Version 1.5. 5 TRA worker v3.		
Exposure estimation	: <b>\</b> F	<b>Worker - inhalative, long-term - local:</b> 0.00017 mg/m³. Risk characterisation ratio: 0.011.			
	<b>\</b> F	<b>Vorker - dermal, long-terr</b> Risk characterisation ratio: (	<b>n - systemic:</b> 0.034 mg/kg bw/day. ).01.		
Remark	: E	Based on the applied RMMs < 1).	s the risk towards humans is sufficiently controlled (RCR		
Exposure estimation and ref	Exposure estimation and reference to its source - Workers: 9: Equipment cleaning and maintenance				
Exposure assessment (human):	:   [	nhalation exposure: Used A Dermal exposure: ECETOC	NRT model. Version 1.5. 5 TRA worker v3.		
Exposure estimation	: <b>\</b> F	<b>Vorker - inhalative, long-t</b> Risk characterisation ratio: (	<b>erm - local:</b> 0.0046 mg/m³. ).307.		
	<b>V</b> F F	<b>Vorker - dermal, long-terr</b> Risk characterisation ratio: ( Remarks: Exposure Estimat	<b>n - systemic:</b> 1.371 mg/kg bw/day. ).412. tion: PROC08a		
Remark	: E	Based on the applied RMMs < 1).	s the risk towards humans is sufficiently controlled (RCR		

# 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.



Industrial

# Annex to the extended Safety Data Sheet (eSDS)

Identification of the subs	stance or mixture
Product definition	: Mono-constituent substance
Product name	: N-Aminoethylpiperazine, AEP
Section 1 - Title	
Short title of the exposure scenario	: Manufacture.
List of use descriptors	<ul> <li>Identified use name: ES01: Manufacture - Industrial: PROC01, PROC02, PROC03, PROC08b, PROC15, PROC28; ERC01.</li> <li>Process Category: PROC01, PROC02, PROC03, PROC08b, PROC15, PROC28</li> <li>Subsequent service life relevant for that use: No.</li> <li>Environmental Release Category: ERC01</li> </ul>
Environmental contributing scenarios	: Manufacture: - ERC01
Health Contributing scenarios	<ul> <li>Storage - PROC01         General exposures (closed systems); No sampling - PROC01         General exposures (closed systems); Continuous process; With sample collection - PROC02         General exposures; Use in contained batch processes; With sample collection - PROC03         Bulk transfers; Dedicated facility - PROC08b         Laboratory activities - PROC15         Equipment cleaning and maintenance - PROC28         </li> </ul>
Number of the ES	: 01

# Section 2 - Exposure controls

Contributing scenario contro	llin	g environmental exposure for 1: Manufacture:				
Amounts used	:	Daily amount per site: ≤20 tonnes/day. Annual amount per site: ≤2000 tonnes/year.				
Other conditions affecting environmental exposure	:	Release factor after on-site risk management: water: 0.00334% (measured data). Local release rate: 0.667 kg/day. air: 0.01% (Estimated release factor). Local release rate: 2.0 kg/day. Soil: 0.01% (Estimated release factor).				
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least: 0 Discharge rate: ≥2000 m³/d. Application of the STP sludge on agricultural soil: Yes.	0.031%).			
Conditions and measures related to external treatment of waste for disposal	<ul> <li>Disposal should be in accordance with applicable regional, national and local laws and regulations.</li> <li>This product should be treated as a hazardous waste according to EC Directive 2008/98/EC.</li> <li>Prevent entry into sewers, water courses, basements or confined areas.</li> </ul>					
Contributing scenario controlling worker exposure for: All Contributing scenarios						
Product characteristics	:	Liquid with low viscosity. Weight fraction of substance in the article: 1. Vapour pressure (20°C): 5.255 Pa.				
Concentration of substance in mixture or article	:	Covers percentage substance in the product up to 100	%.			
Other conditions affecting workers exposure	:	Indoor use. Operating temperature: ≤20°C.				
Date of issue/Date of revision		: 22/11/2022	Version	:3	/ en	36/66

N-Aminoethylpiperazine, AEF	>	Exposure Scenario: 01 <i>Manufacture.</i>
Organisational measures to	:	Avoid all skin contact with product, clean up contamination/spills as soon as they
prevent/limit releases, dispersion and exposure		occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent/minimise exposures and to report any skin
		problems that may develop. Avoid direct contact with the substance/mixture/product by establishing organisational measures.
		Avoid contact with contaminated tools and objects. Regular cleaning of equipment. Regular cleaning of work area.
		Supervision in place to check that the risk management measures in place are being used correctly and operational conditions followed. Training for staff on good practice.
		Good standard of personal hygiene.
Conditions and measures rela	ate	d to personal protection, hygiene and health evaluation
Personal protection	•	Wear suitable gloves tested to EN374.
Contributing scenario contro	llin	g worker exposure for 2: Storage
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 hours. Exposure period, Distance of worker from source > 1 m: 480 minutes.
Other conditions affecting workers exposure	:	Room size: Any. Activities with open liquid surfaces or open reservoirs - activity with undisturbed surfaces (no aerosol formation). Open surface: > 3 m ³ .
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclosed or the integrity of that enclosure is not regularly monitored. Demonstrable and effective housekeeping practices are in place. Containment - high. Effectiveness of containment: 99.9%.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Management System: Advanced. Store substance within a closed system. Assumes a good basic standard of occupational hygiene is implemented. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Only good natural ventilation. ( <i>ART</i> )
Contributing scenario contro	llin	g worker exposure for  3: General exposures (closed systems); No sampling
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 hours. Exposure period, Distance of worker from source > 1 m: 480 minutes.
Other conditions affecting workers exposure	:	Room size: 1000 m ³ . Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces. Open surface: > 3 m ³ .
Technical conditions and measures at process level	:	The process is not fully enclosed or the integrity of that enclosure is not regularly monitored.
(source) to prevent release		Containment - high. Effectiveness of containment: 99.9%.
Technical conditions and measures to control dispersion from source towards the worker	•	Occupational Health and Safety Management System: Advanced. Handle substance within a closed system. Assumes a good basic standard of occupational hygiene is implemented. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Only good natural ventilation. ( <i>ART</i> )
Contributing scenario contro process; With sample collect	llin ior	g worker exposure for 4: General exposures (closed systems); Continuous
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 hours. Activity/Process 1: Exposure period, Distance of worker from source < 1 m: 10 minutes. Activity/Process 2: Exposure period, Distance of worker from source < 1 m: 50 minutes. Activity/Process 3: Exposure period, Distance of worker from source > 1 m: 420 minutes.
Date of issue/Date of revision		: 22/11/2022 Version : 3 / en 37/66

N-Aminoethylpiperazine, AEP	)	Exposure Scenario: 01	Manufacture.
Other conditions affecting	:	Room size: 1000 m ³ .	
workers exposure		Activity/Process 1: Transfer of - Splash loading.	iquid products - falling liquids:
		Activity/Process 2: Handling of - Activities with treated/contami - Contamination 10 - 90% of su	contaminated objects: nated objects (Surfaces: 1 - 3 m²). ırface.
		Activity/Process 3: Activities wit agitated surfaces: - Open surface: > 3 m ³ .	h open liquid surfaces or open reservoirs - activity with
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored.	ed or the integrity of that enclosure is not regularly
		Activity/Process 1: Transfer of - General housekeeping practi - Transfer of liquid products - fa - Handling that reduces contac	iquid products - falling liquids: ces are in place. alling liquids: < 0.1 L/min. t between product and adjacent air.
		Activity/Process 2: Handling of - Demonstrable and effective h	contaminated objects: ousekeeping practices are in place.
		Activity/Process 3: Activities wit agitated surfaces: - Demonstrable and effective h	h open liquid surfaces or open reservoirs - activity with ousekeeping practices are in place.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safet Handle substance within a clos Assumes a good basic standar Provide a basic standard of ge Only good natural ventilation.	y Management System: Advanced. ed system. d of occupational hygiene is implemented. neral ventilation (1 to 3 air changes per hour). ART)
Conditions and measures rela	ite	d to personal protection. hvg	ene and health evaluation
Personal protection	:	Use suitable eye protection. Wear chemical-resistant glove employee training. Dermal - m	s (tested to EN374) in combination with 'basic' inimum efficiency of 90%.
Contributing scenario control processes; With sample colle	lin cti	g worker exposure for 5: Ger on	neral exposures; Use in contained batch
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 Activity/Process 1: Exposure per minutes. Activity/Process 2: Exposure per minutes. Activity/Process 3: Exposure per minutes. Activity/Process 4: Exposure per minutes.	hours. eriod, Distance of worker from source < 1 m: 20 eriod, Distance of worker from source < 1 m: 60 eriod, Distance of worker from source > 1 m: 380 eriod, Distance of worker from source < 1 m: 20
Other conditions affecting	:	Room size: 1000 m³.	
workers exposure		Activity/Process 1: Transfer of - Splash loading.	iquid products - falling liquids:
		Activity/Process 2 / 4: Handling - Activities with treated/contami - Contamination 10 - 90% of su	of contaminated objects: nated objects (Surfaces: 1 - 3 m²). ırface.
		Activity/Process 3: Activities wit agitated surfaces: - Open surface: > 3 m ³ .	h open liquid surfaces or open reservoirs - activity with

N-Aminoethylpiperazine, AEP	Exposure Scenario: 01 <i>Manufacture.</i>	
Technical conditions and measures at process level (source) to prevent release	: The process is not fully enclosed or the integrity of that enclosure is not regularly monitored.	
(	Activity/Process 1: Transfer of liquid products - falling liquids: - General housekeeping practices are in place. - Transfer of liquid products - falling liquids: < 0.1 L/min. - Handling that reduces contact between product and adjacent air.	
	Activity/Process 2 / 4: Handling of contaminated objects: - Demonstrable and effective housekeeping practices are in place.	
	Activity/Process 3: Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces: - Demonstrable and effective housekeeping practices are in place.	
	- Containment - high. Effectiveness of containment: 99.9%.	
Technical conditions and measures to control	: Occupational Health and Safety Management System: Advanced. Handle substance within a closed system.	
dispersion from source towards the worker	Assumes a good basic standard of occupational hygiene is implemented. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Only good natural ventilation. ( <i>ART</i> )	
Conditions and measures relation	ted to personal protection, hygiene and health evaluation	
Personal protection	: Use suitable eye protection. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90%.	
Contributing scenario controll	ing worker exposure for 6: Bulk transfers; Dedicated facility	
Frequency and duration of use/exposure	: Covers exposure up to 4 hours. Activity/Process 1: Exposure period, Distance of worker from source < 1 m: 20 minutes.	
	Activity/Process 2: Exposure period, Distance of worker from source > 1 m: 200 minutes.	
	Activity/Process 3: Exposure period, Distance of worker from source < 1 m: 20 minutes. Non-exposure period: 240 minutes.	
Other conditions affecting	: Room size: 1000 m ³ .	
workers exposure	Activity/Process 1: Transfer of liquid products - falling liquids: - Splash loading.	
	Activity/Process 3: Handling of contaminated objects: - Activities with treated/contaminated objects (Surfaces: 1 - 3 m²). - Contamination 10 - 90% of surface.	
Technical conditions and measures at process level	: The process is not fully enclosed or the integrity of that enclosure is not regularly monitored.	
(source) to prevent release	Activity/Process 1: Transfer of liquid products - falling liquids: - General housekeeping practices are in place. - Transfer of liquid products - falling liquids: < 0.1 L/min. - Handling that reduces contact between product and adjacent air.	
	Activity/Process 2: Transfer of liquid products - Bottom loading: - Demonstrable and effective housekeeping practices are in place. - Transfer of liquid products - Bottom loading: >1000 L/min.	
	Activity/Process 3: Handling of contaminated objects: - Demonstrable and effective housekeeping practices are in place.	
Technical conditions and measures to control dispersion from source towards the worker	: Occupational Health and Safety Management System: Advanced. Assumes a good basic standard of occupational hygiene is implemented. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Only good natural ventilation. ( <i>ART</i> )	
Conditions and measures rela	ted to personal protection, hygiene and health evaluation	
Personal protection	: Use suitable eye protection. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90%.	
L		

N-Aminoethylpiperazine, AEF	)	Exposure Scenario: 01 <i>Manufacture.</i>			
Contributing scenario controlling worker exposure for 7: Laboratory activities					
Frequency and duration of use/exposure	:	Covers exposure up to 1 hour. Exposure period, Distance of worker from source < 1 m: 60 minutes. Non-exposure period: 420 minutes.			
Other conditions affecting workers exposure	:	Room size: Any. Transfer of liquid products - falling liquids. Splash loading.			
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclosed or the integrity of that enclosure is not regularly monitored. General housekeeping practices are in place. Containment: Open process. Transfer of liquid products - falling liquids: < 0.1 L/min.			
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Management System: Advanced. Assumes a good basic standard of occupational hygiene is implemented. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Local exhaust ventilation: Inhalation - minimum efficiency of 95%. Handle in a fume cupboard. Efficiency of at least 99%.			
Conditions and measures rela	ate	d to personal protection, hygiene and health evaluation			
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90%.			
Contributing scenario control	llin	g worker exposure for 8: Equipment cleaning and maintenance			
Frequency and duration of use/exposure	:	Covers exposure up to 2 hours. Exposure period, Distance of worker from source < 1 m: 120 minutes. Non-exposure period: 360 minutes.			
Other conditions affecting workers exposure	:	Room size: Any. Handling of contaminated objects. Activities with treated/contaminated objects (Surfaces: 1 - 3 m ² ). Contamination 10 - 90% of surface.			
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclosed or the integrity of that enclosure is not regularly monitored. Demonstrable and effective housekeeping practices are in place.			
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Management System: Advanced. Assumes a good basic standard of occupational hygiene is implemented. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Only good natural ventilation. ( <i>ART</i> )			
Conditions and measures rela	ate	d to personal protection, hygiene and health evaluation			
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90%.			

# Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Manufacture:					
Exposure assessment (environment):	: EUSES v2.1.2.				
Exposure estimation	<ul> <li>Freshwater: 0.05 mg/l. Risk characterisation ratio (PEC/PNEC): 0.862.</li> <li>Freshwater sediment: 0.189 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): &lt;0.01.</li> <li>Marine water: 0.005 mg/l. Risk characterisation ratio (PEC/PNEC): 0.861.</li> <li>Marine water sediment: 0.019 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): &lt;0.01.</li> <li>Sewage Treatment Plant: 0.333 mg/l. Risk characterisation ratio (PEC/PNEC): &lt;0.01.</li> </ul>				
Date of issue/Date of revision	: 22/11/2022	Version	:3	/ en	40/66

N-Aminoethylpiperazine, AEP	Exposure Scenario: 01 <i>Manufacture.</i>			
	Soil: 0.011 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.011.			
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).			
Exposure estimation and refere	ence to its source - Workers: 2: Storage			
Exposure assessment : (human):	: Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.			
Exposure estimation	: <b>Worker - inhalative, long-term - local:</b> 0.00036 mg/m³. Risk characterisation ratio: 0.024.			
	<b>Worker - dermal, long-term - systemic:</b> 0.034 mg/kg bw/day. Risk characterisation ratio: 0.01.			
Remark	<ul> <li>Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR &lt; 1).</li> </ul>			
Exposure estimation and refere sampling	ence to its source - Workers: 3: General exposures (closed systems); No			
Exposure assessment (human):	Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.			
Exposure estimation	<b>Worker - inhalative, long-term - local:</b> 0.0013 mg/m ³ . Risk characterisation ratio: 0.087.			
	<b>Worker - dermal, long-term - systemic:</b> 0.034 mg/kg bw/day. Risk characterisation ratio: 0.01.			
Remark	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).			
Exposure estimation and refere	ence to its source - Workers: 4: General exposures (closed systems); Continuous			
Exposure assessment	Inhalation exposure: Used ART model. Version 1.5.			
Exposure estimation	<b>Worker - inhalative, long-term - local:</b> 0.0027 mg/m ³ . Risk characterisation ratio: 0.18.			
	<b>Worker - dermal, long-term - systemic:</b> 0.137 mg/kg bw/day. Risk characterisation ratio: 0.041.			
Remark	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).			
Exposure estimation and refere processes; With sample collect	ence to its source - Workers: 5: General exposures; Use in contained batch tion			
Exposure assessment (human):	: Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.			
Exposure estimation	<b>Worker - inhalative, long-term - local:</b> 0.0038 mg/m³. Risk characterisation ratio: 0.252.			
	<b>Worker - dermal, long-term - systemic:</b> 0.069 mg/kg bw/day. Risk characterisation ratio: 0.021.			
Remark	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).			
Exposure estimation and refere	ence to its source - Workers: 6: Bulk transfers; Dedicated facility			
Exposure assessment (human):	: Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.			
Exposure estimation	<b>Worker - inhalative, long-term - local:</b> 0.0034 mg/m³. Risk characterisation ratio: 0.227.			
	<b>Worker - dermal, long-term - systemic:</b> 1.371 mg/kg bw/day. Risk characterisation ratio: 0.412.			
Date of issue/Date of revision	: 22/11/2022 Version : 3 / en 41/66			

N-Aminoethylpiperazine, AE	Р	Exposure Scenario: 01 <i>Manufacture.</i>		
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).		
Exposure estimation and refe	erei	nce to its source - Workers: 7: Laboratory activities		
Exposure assessment (human):	:	Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.		
Exposure estimation	:	<b>Worker - inhalative, long-term - local:</b> 0.00017 mg/m³. Risk characterisation ratio: 0.011.		
		<b>Worker - dermal, long-term - systemic:</b> 0.034 mg/kg bw/day. 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: 8: Equipment cleaning and maintenance				
Exposure assessment (human):	:	Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.		
Exposure estimation	:	<b>Worker - inhalative, long-term - local:</b> 0.0046 mg/m³. Risk characterisation ratio: 0.307.		
		<b>Worker - dermal, long-term - systemic:</b> 1.371 mg/kg bw/day. Risk characterisation ratio: 0.412. Remarks: Exposure Estimation: PROC08a		
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.



Industrial

# Annex to the extended Safety Data Sheet (eSDS)

Identification of the subs	sta	ance or mixture
Product definition	:	Mono-constituent substance
Product name	:	N-Aminoethylpiperazine, AEP
Section 1 - Title		
Short title of the exposure scenario	:	Formulation or re-packing.
List of use descriptors	:	Identified use name: ES02: Formulation and (re)packing of substances and mixtures - Industrial: PROC01, PROC02, PROC03, PROC08b, PROC09, PROC15, PROC28; ERC02. Process Category: PROC01, PROC02, PROC03, PROC08b, PROC09, PROC15, PROC28 Subsequent service life relevant for that use: No. Environmental Release Category: ERC02
Environmental contributing scenarios	:	Formulation and (re)packing of substances and mixtures - ERC02
Health Contributing scenarios	:	Storage - PROC01 General exposures (closed systems); No sampling - PROC01 General exposures (closed systems); Continuous process; With sample collection - PROC02 General exposures; Use in contained batch processes; With sample collection - PROC03 Bulk transfers; Dedicated facility - PROC08b Drum and small package filling; Dedicated facility; Automated task - PROC09 Laboratory activities - PROC15 Equipment cleaning and maintenance - PROC28
Number of the ES	:	02
Additional information	:	Information concerning technical function: Intermediate (precursor).

# Section 2 - Exposure controls

Contributing scenario contro mixtures	llin	g environmental exposure for 1: Formulation and (re)packing of substances and
Amounts used	:	Daily amount per site: ≤16.66 tonnes/day. Annual amount per site: ≤5000 tonnes/year.
Other conditions affecting environmental exposure	:	Indoor use. Water contact during use: No.
		Release factor after on-site risk management: water: 0% (FEICA SPERC 2.1b.v3). Local release rate: 0 kg/day. air: 0.36% (FEICA SPERC 2.1b.v3). Local release rate: 60 kg/day. Soil: 0% (FEICA SPERC 2.1b.v3). Local release rate: 0 kg/day.
Technical conditions and measures at process level (source) to prevent release	:	Process with efficient use of raw materials. Automation in raw materials handling: high.
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil	:	Suitable technique(s) to limit releases to air: Adsorption, Incineration. Air - minimum efficiency of 80%.
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least: 0.031%). Discharge rate: ≥2000 m³/d. Application of the STP sludge on agricultural soil: Yes.
Date of issue/Date of revision		: 22/11/2022 <b>Version</b> : 3 / en 43/66

N-Aminoethylpiperazine, AEP	)	Exposure Scenario: 02	Formulation or re-packing.
Conditions and measures related to external treatment of waste for disposal	:	<ul> <li>Disposal should be in accordance with applicable regional, national and local laws and regulations.</li> <li>This product should be treated as a hazardous waste according to EC Directive 2008/98/EC.</li> <li>Prevent entry into sewers, water courses, basements or confined areas.</li> <li>Equipment cleaned with organic solvent, washings are collected and disposed of as solvent waste.</li> <li>Vapor recovery (e.g. adsorption) or other technique for reducing volatiles emissions (incineration, thermal oxidation).</li> </ul>	
Contributing scenario control	lin	g worker exposure for: All Co	ntributing scenarios
Product characteristics	:	Liquid with low viscosity. Weight fraction of substance in Vapour pressure (20°C): 5.255	the article: 1. Pa.
Concentration of substance in mixture or article	:	Covers percentage substance	in the product up to 100%.
Other conditions affecting workers exposure	:	Indoor use. Operating temperature: ≤20°C	
Organisational measures to prevent/limit releases, dispersion and exposure	:	Avoid all skin contact with prod occur. Wear gloves (tested to EN374) contamination immediately. Provide basic employee trainin problems that may develop. Avoid direct contact with the su measures. Avoid splashing. Avoid splashing. Avoid contact with contaminate Regular cleaning of equipment Regular cleaning of equipment Regular cleaning of work area. Supervision in place to check the used correctly and operational Training for staff on good pract Good standard of personal hyper	uct, clean up contamination/spills as soon as they if hand contamination likely, wash off any skin g to prevent/minimise exposures and to report any skin bstance/mixture/product by establishing organisational ed tools and objects. t. hat the risk management measures in place are being conditions followed. tice. giene.
Conditions and measures rela	ate	d to personal protection, hygi	ene and health evaluation
Personal protection	:	Use suitable eye protection. Wear suitable gloves tested to	EN374.
Contributing scenario control	lin	g worker exposure for 2: Sto	rage
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 Exposure period, Distance of w	hours. /orker from source > 1 m: 480 minutes.
Other conditions affecting workers exposure	:	Room size: Any. Activities with open liquid surfaces surfaces (no aerosol formation Open surface: > 3 m ³ .	ces or open reservoirs - activity with undisturbed ).
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored. Demonstrable and effective ho Containment - high. Effectivene	ed or the integrity of that enclosure is not regularly usekeeping practices are in place. ess of containment: 99.9%.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safet Store substance within a closed Assumes a good basic standar Provide a basic standard of gen Only good natural ventilation. (.	ry Management System: Advanced. d system. d of occupational hygiene is implemented. neral ventilation (1 to 3 air changes per hour). ART)

N-Aminoethylpiperazine, AEF	)	Exposure Scenario: 02Formulation or re-packing.
Contributing scenario control	llin	g worker exposure for 3: General exposures (closed systems); No sampling
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 hours. Exposure period, Distance of worker from source > 1 m: 480 minutes.
Other conditions affecting workers exposure	:	Room size: 1000 m ³ . Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces. Open surface: > 3 m ³ .
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclosed or the integrity of that enclosure is not regularly monitored. Demonstrable and effective housekeeping practices are in place. Containment - high. Effectiveness of containment: 99.9%.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Management System: Advanced. Handle substance within a closed system. Assumes a good basic standard of occupational hygiene is implemented. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Only good natural ventilation. ( <i>ART</i> )
Contributing scenario contro process; With sample collect	llin ion	g worker exposure for 4: General exposures (closed systems); Continuous
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 hours. Activity/Process 1: Exposure period, Distance of worker from source < 1 m: 10 minutes. Activity/Process 2: Exposure period, Distance of worker from source < 1 m: 50 minutes. Activity/Process 3: Exposure period, Distance of worker from source > 1 m: 420 minutes.
Other conditions affecting workers exposure	:	Room size: 1000 m ³ . Activity/Process 1: Transfer of liquid products - falling liquids: - Splash loading.
		<ul> <li>Activity/Process 2: Harding of contaminated objects.</li> <li>Activities with treated/contaminated objects (Surfaces: 1 - 3 m²).</li> <li>Contamination 10 - 90% of surface.</li> <li>Activity/Process 3: Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces:</li> <li>Open surface: &gt; 3 m³.</li> </ul>
Technical conditions and measures at process level (source) to prevent release	:	<ul> <li>The process is not fully enclosed or the integrity of that enclosure is not regularly monitored.</li> <li>Activity/Process 1: Transfer of liquid products - falling liquids: <ul> <li>General housekeeping practices are in place.</li> <li>Transfer of liquid products - falling liquids: &lt; 0.1 L/min.</li> <li>Handling that reduces contact between product and adjacent air.</li> </ul> </li> </ul>
		Activity/Process 2: Handling of contaminated objects: - Demonstrable and effective housekeeping practices are in place.
		Activity/Process 3: Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces: - Demonstrable and effective housekeeping practices are in place. - Containment - high. Effectiveness of containment: 99.9%.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Management System: Advanced. Handle substance within a closed system. Assumes a good basic standard of occupational hygiene is implemented. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Only good natural ventilation. ( <i>ART</i> )
Conditions and measures rela	ate	d to personal protection, hygiene and health evaluation
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90%.

N-Aminoethylpiperazine, AEP	Exposure Scenario: 02	Formulation or re-packing.			
Contributing scenario controll processes; With sample collect	Contributing scenario controlling worker exposure for 5: General exposures; Use in contained batch processes; With sample collection				
Frequency and duration of use/exposure	: Covers daily exposures up to Activity/Process 1: Exposure minutes. Activity/Process 2: Exposure minutes. Activity/Process 3: Exposure minutes. Activity/Process 4: Exposure minutes.	8 hours. period, Distance of worker from source < 1 m: 20 period, Distance of worker from source < 1 m: 60 period, Distance of worker from source > 1 m: 380 period, Distance of worker from source < 1 m: 20			
Other conditions affecting	: Room size: 1000 m ³ .				
	Activity/Process 1: Transfer o - Splash loading.	of liquid products - falling liquids:			
	Activity/Process 2 / 4: Handli - Activities with treated/conta - Contamination 10 - 90% of	ng of contaminated objects: minated objects (Surfaces: 1 - 3 m²). surface.			
	Activity/Process 3: Activities v agitated surfaces: - Open surface: > 3 m³.	vith open liquid surfaces or open reservoirs - activity with			
Technical conditions and measures at process level (source) to prevent release	: The process is not fully enclo monitored.	osed or the integrity of that enclosure is not regularly			
	Activity/Process 1: Transfer of - General housekeeping prac - Transfer of liquid products - Handling that reduces cont	of liquid products - falling liquids: ctices are in place. · falling liquids: < 0.1 L/min. act between product and adjacent air.			
	Activity/Process 2 / 4: Handli - Demonstrable and effective	ng of contaminated objects: housekeeping practices are in place.			
	Activity/Process 3: Activities v agitated surfaces: - Demonstrable and effective - Containment - high. Effective	vith open liquid surfaces or open reservoirs - activity with housekeeping practices are in place. veness of containment: 99.9%.			
Technical conditions and measures to control dispersion from source towards the worker	: Occupational Health and Sa Handle substance within a cl Assumes a good basic stand Provide a basic standard of g Only good natural ventilation	fety Management System: Advanced. osed system. ard of occupational hygiene is implemented. general ventilation (1 to 3 air changes per hour). . ( <i>ART</i> )			
Conditions and measures rela	ted to personal protection, hy	giene and health evaluation			
Personal protection	: Use suitable eye protection. Wear chemical-resistant glov employee training. Dermal -	ves (tested to EN374) in combination with 'basic' minimum efficiency of 90%.			
Contributing scenario controll	ing worker exposure for 6: B	ulk transfers; Dedicated facility			
Frequency and duration of use/exposure	: Covers exposure up to 4 hou Activity/Process 1: Exposure minutes. Activity/Process 2: Exposure minutes. Activity/Process 3: Exposure minutes. Non-exposure period: 240 m	rs. period, Distance of worker from source < 1 m: 20 period, Distance of worker from source > 1 m: 200 period, Distance of worker from source < 1 m: 20 inutes.			
Other conditions affecting	Room size: 1000 m ³ .				
workers exposure	Activity/Process 1: Transfer o - Splash loading.	of liquid products - falling liquids:			
	Activity/Process 3: Handling - Activities with treated/conta - Contamination 10 - 90% of	of contaminated objects: minated objects (Surfaces: 1 - 3 m²). surface.			
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N-Aminoethylpiperazine, AEF	2	Exposure Scenario: 02	Formulation or re-packing.
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored.	ed or the integrity of that enclosure is not regularly
(Source) to prevent release		Activity/Process 1: Transfer of I - General housekeeping practic - Transfer of liquid products - fa - Handling that reduces contact	iquid products - falling liquids: es are in place. Illing liquids: < 0.1 L/min. : between product and adjacent air.
		Activity/Process 2: Transfer of I - Demonstrable and effective h - Transfer of liquid products - B	iquid products - Bottom loading: ousekeeping practices are in place. ottom loading: >1000 L/min.
		Activity/Process 3: Handling of - Demonstrable and effective h	contaminated objects: ousekeeping practices are in place.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safet Assumes a good basic standard Provide a basic standard of ger Only good natural ventilation. ( <i>A</i>	y Management System: Advanced. d of occupational hygiene is implemented. neral ventilation (1 to 3 air changes per hour). ART)
Conditions and measures rela	ate	d to personal protection, hygi	ene and health evaluation
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves employee training. Dermal - mi	s (tested to EN374) in combination with 'basic' nimum efficiency of 90%.
Contributing scenario contro Automated task	llin	g worker exposure for 7: Dru	m and small package filling; Dedicated facility;
Frequency and duration of use/exposure	:	Covers exposure up to 4 hours. Activity/Process 1: Exposure per minutes.	riod, Distance of worker from source < 1 m: 30
		Activity/Process 2: Exposure per minutes. Non-exposure period: 240 minutes	riod, Distance of worker from source > 1 m: 210 ites.
Other conditions affecting workers exposure	:	Room size: 1000 m³. Splash loading.	
Technical conditions and measures at process level (source) to prevent release	:	Activity/Process 1 / 2: Transfer - The process is not fully enclose monitored. - Demonstrable and effective h - Transfer of liquid products - fa - Handling that reduces contact	of liquid products - falling liquids: sed or the integrity of that enclosure is not regularly ousekeeping practices are in place. illing liquids: 100 - 1000 L/min. between product and adjacent air.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safet Assumes a good basic standard Provide a basic standard of ger Only good natural ventilation. (A Local exhaust ventilation. Ensu efficiency of 90%. Fill containers/cans at dedicate Efficiency of at least 90%.	y Management System: Advanced. d of occupational hygiene is implemented. neral ventilation (1 to 3 air changes per hour). ART) re fixed capturing hood is used. Inhalation - minimum d fill points supplied with local extract ventilation.
Conditions and measures rela	ate	d to personal protection, hygi	ene and health evaluation
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves employee training. Dermal - mi	e (tested to EN374) in combination with 'basic' nimum efficiency of 90%.
Contributing scenario contro	llin	g worker exposure for 8: Lab	oratory activities
Frequency and duration of use/exposure	:	Covers exposure up to 1 hour. Exposure period, Distance of w Non-exposure period: 420 minu	orker from source < 1 m: 60 minutes. ites.
Other conditions affecting workers exposure	:	Room size: Any. Transfer of liquid products - fall Splash loading.	ing liquids.
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored. General housekeeping practice Containment: Open process. Transfer of liquid products - fall	ed or the integrity of that enclosure is not regularly as are in place. ing liquids: < 0.1 L/min.
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N-Aminoethylpiperazine, AEP	)	Exposure Scenario: 02 <i>Formulation or re-packing.</i>
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Management System: Advanced. Assumes a good basic standard of occupational hygiene is implemented. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). >3 ach (air changes per hour). ( <i>ART</i> ) Local exhaust ventilation: Inhalation - minimum efficiency of 95%. Handle in a fume cupboard. Efficiency of at least 99%.
Conditions and measures rela	ate	d to personal protection, hygiene and health evaluation
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90%.
Contributing scenario control	lin	g worker exposure for 9: Equipment cleaning and maintenance
Frequency and duration of use/exposure	:	Covers exposure up to 2 hours. Exposure period, Distance of worker from source < 1 m: 120 minutes. Non-exposure period: 360 minutes.
Other conditions affecting workers exposure	:	Room size: Any. Handling of contaminated objects. Activities with treated/contaminated objects (Surfaces: 1 - 3 m ² ). Contamination 10 - 90% of surface.
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclosed or the integrity of that enclosure is not regularly monitored. Demonstrable and effective housekeeping practices are in place.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Management System: Advanced. Assumes a good basic standard of occupational hygiene is implemented. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Only good natural ventilation. ( <i>ART</i> )
Conditions and measures rela	ate	d to personal protection, hygiene and health evaluation
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90%.

# Section 3 - Exposure estimation and reference to its source

Exposure estimation and r and mixtures	eference to its source - Environment: 1: Formulation and (re)packing of substances
Exposure assessment (environment):	: EUSES v2.1.2.
Exposure estimation	: Freshwater: 0.017 mg/l. Risk characterisation ratio (PEC/PNEC): 0.287.
	Freshwater sediment: 0.063 mg/kg dwt. Risk characterisation ratio (PEC/PNEC):< 0.01.
	Marine water: 0.00166 mg/l. Risk characterisation ratio (PEC/PNEC): 0.286.
	Marine water sediment: 0.00628 mg/kg dwt. Risk characterisation ratio (PEC/PNEC):< 0.01.
	Sewage Treatment Plant: 0 mg/l. Risk characterisation ratio (PEC/PNEC):< 0.01.
	Soil: 0.018 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.018.
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).

N-Aminoethylpiperazine, A	EP	Exposure Scenario: 02 <i>Formulation or re-packing.</i>	
Exposure estimation and re	eferer	nce to its source - Workers: 2: Storage	
Exposure assessment (human):	:	Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.	
Exposure estimation	:	<b>Worker - inhalative, long-term - local:</b> 0.000036 mg/m ³ . Risk characterisation ratio: < 0.01.	
		<b>Worker - dermal, long-term - systemic:</b> 0.034 mg/kg bw/day. Risk characterisation ratio: 0.01.	
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently cont < 1).	rolled (RCR
Exposure estimation and re sampling	eferer	nce to its source - Workers: 3: General exposures (closed systems)	; No
Exposure assessment (human):	:	Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.	
Exposure estimation	:	<b>Worker - inhalative, long-term - local:</b> 0.0013 mg/m ³ . Risk characterisation ratio: 0.087.	
		<b>Worker - dermal, long-term - systemic:</b> 0.034 mg/kg bw/day. Risk characterisation ratio: 0.01.	
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently cont < 1).	rolled (RCR
Exposure estimation and reprocess; With sample colle	eferer ction	nce to its source - Workers: 4: General exposures (closed systems) 1	; Continuous
Exposure assessment (human):	:	Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.	
Exposure estimation	:	<b>Worker - inhalative, long-term - local:</b> 0.0027 mg/m ³ . Risk characterisation ratio: 0.18	
		<b>Worker - dermal, long-term - systemic:</b> 0.137 mg/kg bw/day. Risk characterisation ratio: 0.041.	
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently cont < 1).	rolled (RCR
Exposure estimation and re processes; With sample co	eferer Ilecti	nce to its source - Workers: 5: General exposures; Use in contained ion	batch
Exposure assessment (human):	:	Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.	
Exposure estimation	:	<b>Worker - inhalative, long-term - local:</b> 0.0038 mg/m ³ . Risk characterisation ratio: 0.253.	
		<b>Worker - dermal, long-term - systemic:</b> 0.069 mg/kg bw/day. Risk characterisation ratio: 0.021.	
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently cont < 1).	rolled (RCR
Exposure estimation and re	eferer	nce to its source - Workers: 6: Bulk transfers; Dedicated facility	
Exposure assessment (human):	:	Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.	
Exposure estimation	:	<b>Worker - inhalative, long-term - local:</b> 0.0034 mg/m ³ . Risk characterisation ratio: 0.227.	
		<b>Worker - dermal, long-term - systemic:</b> 1.371 mg/kg bw/day. Risk characterisation ratio: 0.412.	
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently cont < 1).	rolled (RCR

N-Aminoethylpiperazine, AEF	2	Exposure Scenario: 02	Formulation or re-packing.
Exposure estimation and refe Automated task	erei	nce to its source - Workers: 7	': Drum and small package filling; Dedicated facility;
Exposure assessment (human):	:	Inhalation exposure: Used AR Dermal exposure: ECETOC T	T model. Version 1.5. RA worker v3.
Exposure estimation	:	Worker - inhalative, long-ter Risk characterisation ratio: 0.6	<b>m - local:</b> 0.01 mg/m³. 667.
		Worker - dermal, long-term Risk characterisation ratio: 0.2	<b>- systemic:</b> 0.686 mg/kg bw/day. 206.
Remark	:	Based on the applied RMMs t < 1).	ne risk towards humans is sufficiently controlled (RCR
Exposure estimation and refe	erei	nce to its source - Workers: 8	3: Laboratory activities
Exposure assessment (human):	:	Inhalation exposure: Used AR Dermal exposure: ECETOC T	T model. Version 1.5. RA worker v3.
Exposure estimation	:	<b>Worker - inhalative, long-ter</b> Risk characterisation ratio: 0.0	<b>m - local:</b> 0.00017 mg/m³. 11.
		Worker - dermal, long-term Risk characterisation ratio: 0.0	<b>- systemic:</b> 0.034 mg/kg bw/day. 11.
Remark	:	Based on the applied RMMs t < 1).	ne risk towards humans is sufficiently controlled (RCR
Exposure estimation and refe	erei	nce to its source - Workers: \$	9: Equipment cleaning and maintenance
Exposure assessment (human):	:	Inhalation exposure: Used AR Dermal exposure: ECETOC T	T model. Version 1.5. RA worker v3.
Exposure estimation	:	Worker - inhalative, long-ter Risk characterisation ratio: 0.3	<b>m - local:</b> 0.0046 mg/m³. 007.
		Worker - dermal, long-term Risk characterisation ratio: 0.4 Remarks: Exposure Estimatio	- <b>systemic:</b> 1.371 mg/kg bw/day. 12. n: PROC08a
Remark	:	Based on the applied RMMs t < 1).	ne risk towards humans is sufficiently controlled (RCR

#### 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.



Industrial

# Annex to the extended Safety Data Sheet (eSDS)

Identification of the subs	stance or mixture
Product definition	: Mono-constituent substance
Product name	: N-Aminoethylpiperazine, AEP
Section 1 - Title	
Short title of the exposure scenario	: Use at industrial sites.
List of use descriptors	<ul> <li>Identified use name: ES05: Monomer in Polymer Manufacture of polyamides and copolymers - Industrial: PROC01, PROC02, PROC03, PROC06, PROC08b, PROC14 PROC15, PROC28; ERC04.</li> <li>Process Category: PROC01, PROC02, PROC03, PROC06, PROC08b, PROC14, PROC15, PROC28</li> <li>Subsequent service life relevant for that use: No. Environmental Release Category: ERC04</li> </ul>
Environmental contributing scenarios	: Monomer in Polymer Manufacture of polyamides and copolymers - ERC04
Health Contributing scenarios	<ul> <li>Storage - PROC01         General exposures (closed systems); No sampling - PROC01     </li> <li>Polymerisation (closed systems); Continuous process; With sample collection - PROC02     </li> <li>Polymerisation; Use in contained batch processes; With sample collection - PROC03</li> <li>Pelletisation (extrusion); elevated temperature - PROC06</li> <li>Bulk transfers; Dedicated facility - PROC08b</li> <li>Pelletisation (extrusion) - PROC14</li> <li>Laboratory activities - PROC15</li> <li>Equipment cleaning and maintenance - PROC28</li> </ul>
Number of the ES	: 05
Additional information	: Information concerning technical function: Intermediate (precursor).

#### Section 2 - Exposure controls

Contributing scenario control polyamides and copolymers	lin	g environmental exposure for 1: Monomer in Polymer Manufacture of
Amounts used	:	Daily amount per site: ≤50 tonnes/day. Annual amount per site: ≤5000 tonnes/year.
Other conditions affecting environmental exposure	:	Indoor use.
		Release factor after on-site risk management: water: 0 % (ESVOC SPERC 4.21a.v1). Local release rate: 0 kg/day. air: 10 % (ESVOC SPERC 4.21a.v1). Local release rate: 5000 kg/day. Soil: 0.001 % (ESVOC SPERC 4.21a.v1). Local release rate: 0 kg/day.
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least: 0.031%). Discharge rate: ≥2000 m³/d. Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal	:	Disposal should be in accordance with applicable regional, national and local laws and regulations. This product should be treated as a hazardous waste according to EC Directive 2008/98/EC. Prevent entry into sewers, water courses, basements or confined areas.

N-Aminoethylpiperazine, AEF	2	Exposure Scenario: 05	Use at industrial sites.	
Contributing scenario controlling worker exposure for: All Contributing scenarios				
Product characteristics	:	Liquid with low viscosity. Vapour pressure (20°C): 5.255	Pa.	
Other conditions affecting workers exposure	:	Indoor use.		
Organisational measures to prevent/limit releases, dispersion and exposure	:	Avoid all skin contact with produ occur. Wear gloves (tested to EN374) contamination immediately.	uct, clean up contamination/spills as soon as they if hand contamination likely, wash off any skin	
		Provide basic employee training problems that may develop. Avoid direct contact with the sub measures. Avoid splashing. Avoid contact with contaminated	g to prevent/minimise exposures and to report any skin bstance/mixture/product by establishing organisational d tools and objects.	
		Regular cleaning of equipment. Regular cleaning of work area. Supervision in place to check th used correctly and operational Training for staff on good practi Good standard of personal hyg	nat the risk management measures in place are being conditions followed. ice. iene.	
Conditions and measures rel	ate	d to personal protection, hygi	ene and health evaluation	
Personal protection	:	Use suitable eye protection. Wear suitable gloves tested to I	EN374.	
Contributing scenario contro	llir	ig worker exposure for 2: Stor	rage	
Product characteristics	:	Weight fraction of substance in	the article: 1.	
Concentration of substance in mixture or article	:	Covers percentage substance i	n the product up to 100%.	
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 Exposure period, Distance of w	hours. orker from source > 1 m: 480 minutes.	
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C. Room size: Any. Activities with open liquid surface surfaces (no aerosol formation) Open surface: > 3 m ³ .	ces or open reservoirs - activity with undisturbed ).	
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored. Demonstrable and effective hou Containment - high, Effectivene	ed or the integrity of that enclosure is not regularly usekeeping practices are in place. ess of containment: 99.9%.	
Technical conditions and	:	Occupational Health and Safety	y Management System: Advanced.	
measures to control dispersion from source towards the worker		Assumes a good basic standard Provide a basic standard of gen Only good natural ventilation. (A	d system. d of occupational hygiene is implemented. heral ventilation (1 to 3 air changes per hour). 4 <i>RT</i> )	
Contributing scenario contro	llir	ig worker exposure for 3: Gen	eral exposures (closed systems); No sampling	
Product characteristics	:	Weight fraction of substance in	the article: 1.	
Concentration of substance in mixture or article	:	Covers percentage substance i	n the product up to 100%.	
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 Exposure period, Distance of w	hours. orker from source > 1 m: 480 minutes.	
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C. Room size: 1000 m³. Activities with open liquid surfac Open surface: > 3 m³.	ces or open reservoirs - activity with agitated surfaces.	
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored. Demonstrable and effective hou Containment - high. Effectivene	ed or the integrity of that enclosure is not regularly usekeeping practices are in place. ess of containment: 99.9%.	
Date of issue/Date of revision		: 22/11/2022	<b>Version</b> : 3 / en 52/66	

N-Aminoethylpiperazine, AEP		Exposure Scenario: 05Use at industrial sites.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Management System: Advanced. Handle substance within a closed system. Assumes a good basic standard of occupational hygiene is implemented. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Only good natural ventilation. ( <i>ART</i> )
Contributing scenario controll process: With sample collection	lin on	g worker exposure for 4: Polymerisation (closed systems); Continuous
Product characteristics	:	Weight fraction of substance in the article: 1.
Concentration of substance in mixture or article	:	Covers percentage substance in the product up to 100%.
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 hours. Activity/Process 1: Exposure period, Distance of worker from source < 1 m: 10 minutes. Activity/Process 2: Exposure period, Distance of worker from source < 1 m: 50 minutes. Activity/Process 3: Exposure period, Distance of worker from source > 1 m: 420 minutes.
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C. Room size: 1000 m³.
Technical conditions and measures at process level (source) to prevent release	:	<ul> <li>Activity/Process 1: Transfer of liquid products - falling liquids:</li> <li>Splash loading.</li> <li>Activity/Process 2: Handling of contaminated objects:</li> <li>Activities with treated/contaminated objects (Surfaces: 1 - 3 m²).</li> <li>Contamination 10 - 90% of surface.</li> <li>Activity/Process 3: Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces:</li> <li>Open surface: &gt; 3 m³.</li> <li>The process is not fully enclosed or the integrity of that enclosure is not regularly monitored.</li> <li>Activity/Process 1: Transfer of liquid products - falling liquids:</li> <li>General housekeeping practices are in place.</li> <li>Transfer of liquid products - falling liquids: &lt; 0.1 L/min.</li> <li>Handling that reduces contact between product and adjacent air.</li> <li>Activity/Process 2: Handling of contaminated objects:</li> <li>Demonstrable and effective housekeeping practices are in place.</li> </ul>
Technical conditions and measures to control dispersion from source towards the worker Conditions and measures rela Personal protection	: te :	Activity/Process 3: Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces: - Demonstrable and effective housekeeping practices are in place. - Containment - high. Effectiveness of containment: 99.9%. Occupational Health and Safety Management System: Advanced. Handle substance within a closed system. Assumes a good basic standard of occupational hygiene is implemented. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Only good natural ventilation. ( <i>ART</i> ) <b>d to personal protection, hygiene and health evaluation</b> Use suitable eye protection. Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90%.

N-Aminoethylpiperazine, AEI	D	Exposure Scenario: 05	Use at industrial sites.
Contributing scenario contro With sample collection	ollin	g worker exposure for 5: F	Polymerisation; Use in contained batch processes;
Product characteristics	:	Weight fraction of substance	e in the article: 1.
Concentration of substance in mixture or article	:	Covers percentage substand	ce in the product up to 100%.
Frequency and duration of use/exposure	:	Covers daily exposures up to Activity/Process 1: Exposure minutes. Activity/Process 2: Exposure minutes. Activity/Process 3: Exposure minutes. Activity/Process 4: Exposure minutes.	o 8 hours. period, Distance of worker from source < 1 m: 20 period, Distance of worker from source < 1 m: 60 period, Distance of worker from source > 1 m: 380 period, Distance of worker from source < 1 m: 20
Other conditions affecting workers exposure	:	Operating temperature: ≤20 Room size: 1000 m³.	°C.
		Activity/Process 1: Transfer - Splash loading.	of liquid products - falling liquids:
		Activity/Process 2 / 4: Handl - Activities with treated/conta - Contamination 10 - 90% of	ing of contaminated objects: iminated objects (Surfaces: 1 - 3 m²). ⁻ surface.
		Activity/Process 3: Activities agitated surfaces: - Open surface: > 3 m ³ .	with open liquid surfaces or open reservoirs - activity with
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully encl monitored.	osed or the integrity of that enclosure is not regularly
		Activity/Process 1: Transfer - General housekeeping pra - Transfer of liquid products - Handling that reduces com	of liquid products - falling liquids: ctices are in place. - falling liquids: < 0.1 L/min. tact between product and adjacent air.
		Activity/Process 2 / 4: Handl - Demonstrable and effective	ing of contaminated objects: e housekeeping practices are in place.
		Activity/Process 3: Activities agitated surfaces: - Demonstrable and effectiv - Containment - high. Effecti	with open liquid surfaces or open reservoirs - activity with e housekeeping practices are in place. veness of containment: 99.9%.
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Sa Handle substance within a c Assumes a good basic stand Provide a basic standard of Only good natural ventilation	fety Management System: Advanced. losed system. dard of occupational hygiene is implemented. general ventilation (1 to 3 air changes per hour). n. ( <i>ART</i> )
Conditions and measures rel	ate	d to personal protection, h	ygiene and health evaluation
Personal protection	:	Use suitable eye protection. Wear chemical-resistant glo employee training. Dermal -	ves (tested to EN374) in combination with 'basic' minimum efficiency of 90%.
Contributing scenario contro	llin	g worker exposure for 6: F	Pelletisation (extrusion); elevated temperature
In accordance with Article 14 characterisation does not nee	(2a d to	-f) of the REACH Regulation be performed if the substant	(EC) No 1907/2006, exposure estimation and risk ce in a mixture is less than 0.1%.
Product characteristics	:	Liquid mole fraction: 0.2. activity coefficient: 1.	
Concentration of substance in mixture or article	:	Covers percentage substand	ce in the product up to 0.1%.
Frequency and duration of use/exposure	:	Covers daily exposures up to Exposure period, Distance o	o 8 hours. f worker from source > 1 m: 480 minutes.
Date of issue/Date of revision		: 22/11/2022	<b>Version</b> : 3 / en 54/6

N-Aminoethylpiperazine, AEP	)	Exposure Scenario: 05	Use at industrial sites.	
Other conditions affecting workers exposure	:	Operating temperature: ≤60°C. Room size: 300 m ³ . Handling of contaminated object Activities with treated/contaminat Contamination 10 - 90% of surf	ots. Ited objects (Surfaces 1 - 3 m²). ace.	
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored. Demonstrable and effective how Containment - high. Effectivene	d or the integrity of that enclosure is not regularly usekeeping practices are in place. ss of containment: 99.9%.	
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Assumes a good basic standard Provide a basic standard of gen Only good natural ventilation. (A Local exhaust ventilation Inhala Localised controls (secondary): occur. Efficiency of at least ≥ 50	v Management System: Advanced. d of occupational hygiene is implemented. eral ventilation (1 to 3 air changes per hour). ART) tion - minimum efficiency of 50%. Provide extract ventilation to points where emissions %. (ART)	
Contributing scenario control	lin	g worker exposure for 7: Bulk	transfers; Dedicated facility	
Product characteristics	:	Weight fraction of substance in	the article: 1.	
Concentration of substance in mixture or article	:	Covers percentage substance i	n the product up to 100%.	
Frequency and duration of use/exposure	:	Covers exposure up to 4 hours. Activity/Process 1: Exposure pe minutes. Activity/Process 2: Exposure pe minutes. Activity/Process 3: Exposure pe minutes. Non-exposure period: 240 minutes.	riod, Distance of worker from source < 1 m: 20 riod, Distance of worker from source > 1 m: 200 riod, Distance of worker from source < 1 m: 20 tes.	
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C. Room size: 1000 m³.		
		<ul> <li>Activity/Process 1: Transfer of II</li> <li>Splash loading.</li> <li>Activity/Process 3: Handling of a</li> <li>Activities with treated/contamir</li> <li>Contamination 10 - 90% of su</li> </ul>	quid products - failing liquids: contaminated objects: nated objects (Surfaces: 1 - 3 m²). rface.	
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored.	d or the integrity of that enclosure is not regularly	
		Activity/Process 1: Transfer of li - General housekeeping practic - Transfer of liquid products - fa - Handling that reduces contact	quid products - falling liquids: es are in place. Iling liquids: < 0.1 L/min. between product and adjacent air.	
		Activity/Process 2: Transfer of li - Demonstrable and effective he - Transfer of liquid products - Be	quid products - Bottom loading: busekeeping practices are in place. bttom loading: >1000 L/min.	
		Activity/Process 3: Handling of a - Demonstrable and effective he	contaminated objects: busekeeping practices are in place.	
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Assumes a good basic standard Provide a basic standard of gen Only good natural ventilation. (A	/ Management System: Advanced. d of occupational hygiene is implemented. eral ventilation (1 to 3 air changes per hour). ART)	
Conditions and measures rela	Conditions and measures related to personal protection, hygiene and health evaluation			
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves employee training. Dermal - min	(tested to EN374) in combination with 'basic' nimum efficiency of 90%.	

N-Aminoethylpiperazine, AEP		Exposure Scenario: 05	Use at industrial sites.	
Contributing scenario control	llin	g worker exposure for 8: Pelle	etisation (extrusion)	
In accordance with Article 14 (2a-f) of the REACH Regulation (EC) No 1907/2006, exposure estimation and risk characterisation does not need to be performed if the substance in a mixture is less than 0.1%.				
Product characteristics	:	Liquid mole fraction: 0.2. activity coefficient: 1.		
Concentration of substance in mixture or article	:	Covers percentage substance in	n the product up to 0.1%.	
Frequency and duration of use/exposure	:	Covers daily exposures up to 8	hours.	
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Assumes a good basic standard Provide a basic standard of gen Only good natural ventilation. (A	/ Management System: Advanced. d of occupational hygiene is implemented. eral ventilation (1 to 3 air changes per hour). ART)	
Contributing scenario control	lin	g worker exposure for 9: Lab	pratory activities	
Product characteristics	:	Weight fraction of substance in	the article: 1.	
Concentration of substance in mixture or article	:	Covers percentage substance in	n the product up to 100%.	
Frequency and duration of use/exposure	:	Covers exposure up to 1 hour. Exposure period, Distance of we Non-exposure period: 420 minut	orker from source < 1 m: 60 minutes. tes.	
Other conditions affecting workers exposure	•	Operating temperature: ≤20°C. Room size: Any. Transfer of liquid products - fall Splash loading.	ing liquids.	
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored. General housekeeping practice Containment: Open process. Transfer of liquid products - fall	d or the integrity of that enclosure is not regularly s are in place. ing liquids: < 0.1 L/min.	
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Assumes a good basic standard Provide a good standard of gen hour). >3 ach (air changes per hour). Local exhaust ventilation: Inhala Handle in a fume cupboard. Eff	(Management System: Advanced. d of occupational hygiene is implemented. eral ventilation (not less than 3 to 5 air changes per (ART) ation - minimum efficiency of 95%. iciency of at least 99%.	
Conditions and measures rela	ate	d to personal protection, hygie	ene and health evaluation	
Personal protection	:	Use suitable eye protection. Wear chemical-resistant gloves employee training. Dermal - min	(tested to EN374) in combination with 'basic' nimum efficiency of 90%.	
Contributing scenario control	llin	g worker exposure for 10: Eq	uipment cleaning and maintenance	
Product characteristics	:	Weight fraction of substance in	the article: 1.	
Concentration of substance in mixture or article	:	Covers percentage substance in	n the product up to 100%.	
Frequency and duration of use/exposure	:	Covers exposure up to 2 hours. Exposure period, Distance of we Non-exposure period: 360 minu	orker from source < 1 m: 120 minutes. tes.	
Other conditions affecting workers exposure	:	Operating temperature: ≤20°C. Room size: Any. Handling of contaminated object Activities with treated/contamination Contamination 10 - 90% of surface	ots. ated objects (Surfaces: 1 - 3 m²). ace.	
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclose monitored. Demonstrable and effective hou	d or the integrity of that enclosure is not regularly usekeeping practices are in place.	

N-Aminoethylpiperazine, AEP	Exposure Scenario: 05	Use at industrial sites.
Technical conditions and : measures to control dispersion from source towards the worker	Occupational Health and Safet Assumes a good basic standar Provide a basic standard of ger Only good natural ventilation. (	y Management System: Advanced. d of occupational hygiene is implemented. neral ventilation (1 to 3 air changes per hour). 4 <i>RT</i> )
Conditions and measures relate	ed to personal protection, hygi	ene and health evaluation
Personal protection :	Use suitable eye protection. Wear chemical-resistant gloves employee training. Dermal - m	s (tested to EN374) in combination with 'basic' nimum efficiency of 90%.

# Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference polyamides and copolymers	erence to its source - Environment: 1: Monomer in Polymer Manufacture of
Exposure assessment (environment):	: EUSES v2.1.2.
Exposure estimation	: Freshwater: 0.0107 mg/l. Risk characterisation ratio (PEC/PNEC): 0.287.
	Freshwater sediment: 0.063 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01.
	Marine water: 0.00166 mg/l. Risk characterisation ratio (PEC/PNEC): 0.286.
	Marine water sediment: 0.00628 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01.
	Sewage Treatment Plant: 0.0 mg/l. Risk characterisation ratio (PEC/PNEC): <0.01.
	Soil: 0.204 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.204.
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).
Exposure estimation and refe	erence to its source - Workers: 2: Storage
Exposure assessment (human):	<ul> <li>Inhalation exposure: Used ART model. Version 1.5.</li> <li>Dermal exposure: ECETOC TRA worker v3.</li> </ul>
Exposure estimation	: Worker - inhalative, long-term - local: 0.000036 mg/m ³ . Risk characterisation ratio: <0.01.
	<b>Worker - dermal, long-term - systemic:</b> 0.034 mg/kg bw/day. Risk characterisation ratio: 0.01.
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).
Exposure estimation and refe sampling	erence to its source - Workers: 3: General exposures (closed systems); No
Exposure assessment (human):	<ul> <li>Inhalation exposure: Used ART model. Version 1.5.</li> <li>Dermal exposure: ECETOC TRA worker v3.</li> </ul>
Exposure estimation	: Worker - inhalative, long-term - local: 0.0013 mg/m ³ . Risk characterisation ratio: 0.087.
	<b>Worker - dermal, long-term - systemic:</b> 0.034 mg/kg bw/day. 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: 4: Polymerisation (closed systems); Coprocess; With sample collection         Exposure assessment (human):       : Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.         Exposure estimation       : Worker - inhalative, long-term - local: 0.0027 mg/m³.	ontinuous
Exposure assessment (human):: Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.Exposure estimation: Worker - inhalative, long-term - local: 0.0027 mg/m³.	
Exposure estimation : Worker - inhalative, long-term - local: 0.0027 mg/m ³ .	
Risk characterisation ratio: 0.18.	
<b>Worker - dermal, long-term - systemic:</b> 0.137 mg/kg bw/day. Risk characterisation ratio: 0.041.	
Remark       : Based on the applied RMMs the risk towards humans is sufficiently cor         < 1).	ntrolled (RCR
Exposure estimation and reference to its source - Workers: 5: Polymerisation; Use in contained ba processes: With sample collection	atch
Exposure assessment (human):       : Inhalation exposure: Used ART model. Version 1.5.         Dermal exposure: ECETOC TRA worker v3.	
Exposure estimation: Worker - inhalative, long-term - local: 0.0038 mg/m³.Risk characterisation ratio: 0.253.	
<b>Worker - dermal, long-term - systemic:</b> 0.069 mg/kg bw/day. Risk characterisation ratio: 0.021.	
<b>Remark</b> : Based on the applied RMMs the risk towards humans is sufficiently cor < 1).	ntrolled (RCR
Exposure estimation and reference to its source - Workers: 6: Pelletisation (extrusion); elevated te	emperature
<b>Exposure assessment</b> (human): In accordance with Article 14 (2a-f) of the REACH Regulation (EC) No exposure estimation and risk characterisation does not need to be perf substance in a mixture is less than 0.1%.	1907/2006, formed if the
Exposure estimation : Not applicable.	
Exposure estimation and reference to its source - Workers: 7: Bulk transfers; Dedicated facility	
Exposure assessment (human):: Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.	
Exposure estimation: Worker - inhalative, long-term - local: 0.0034 mg/m³. Risk characterisation ratio: 0.227.	
<b>Worker - dermal, long-term - systemic:</b> 1.371 mg/kg bw/day. Risk characterisation ratio: 0.412.	
<b>Remark</b> : Based on the applied RMMs the risk towards humans is sufficiently cor < 1).	ntrolled (RCR
Exposure estimation and reference to its source - Workers: 8: Pelletisation (extrusion)	
<ul> <li>Exposure assessment (human):</li> <li>In accordance with Article 14 (2a-f) of the REACH Regulation (EC) No exposure estimation and risk characterisation does not need to be perf substance in a mixture is less than 0.1%.</li> </ul>	1907/2006, formed if the
Exposure estimation : Not applicable.	
Exposure estimation and reference to its source - Workers: 9: Laboratory activities	
Exposure assessment (human):: Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.	
Exposure estimation: Worker - inhalative, long-term - local: 0.00017 mg/m³. Risk characterisation ratio: 0.011.	
<b>Worker - dermal, long-term - systemic:</b> 0.034 mg/kg bw/day. Risk characterisation ratio: 0.01.	
Remark       : Based on the applied RMMs the risk towards humans is sufficiently cor         < 1).	ntrolled (RCR

N-Aminoethylpiperazine, AEP	Exposure Scenario: 05	Use at industrial sites.		
Exposure estimation and refer	Exposure estimation and reference to its source - Workers: 10: Equipment cleaning and maintenance			
Exposure assessment (human):	: Inhalation exposure: Used Dermal exposure: ECETO	ART model. Version 1.5. C TRA worker v3.		
Exposure estimation	: Worker - inhalative, long- Risk characterisation ratio:	<b>term - local:</b> 0.0046 mg/m³. 0.307.		
	<b>Worker - dermal, long-ter</b> Risk characterisation ratio: Remarks: Exposure Estima	<b>m - systemic:</b> 1.371 mg/kg bw/day. 0.412. ition: PROC08a		
Remark	: Based on the applied RMM < 1).	s the risk towards humans is sufficiently controlled (RCR		

# 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
Environment	<ul> <li>may be used for this evaluation.</li> <li>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.</li> </ul>



Industrial

# Annex to the extended Safety Data Sheet (eSDS)

Identification of the subs	stance or mixture
Product definition	: Mono-constituent substance
Product name	: N-Aminoethylpiperazine, AEP
Section 1 - Title	
Short title of the exposure scenario	: Use at industrial sites.
List of use descriptors	<ul> <li>Identified use name: ES06: Gas Sweetening - Industrial: PROC01, PROC02, PROC03, PROC08b, PROC28; ERC07.</li> <li>Process Category: PROC01, PROC02, PROC03, PROC08b, PROC28</li> <li>Subsequent service life relevant for that use: No.</li> <li>Environmental Release Category: ERC07</li> </ul>
Environmental contributing scenarios	: Gas Sweetening - ERC07
Health Contributing scenarios	<ul> <li>Storage - PROC01         General exposures (closed systems); No sampling - PROC01         Polymerisation (closed systems); Continuous process; With sample collection             - PROC02             Polymerisation; Use in contained batch processes; With sample collection -             PROC03             Bulk transfers; Dedicated facility - PROC08b             Equipment cleaning and maintenance - PROC28         </li> </ul>
Number of the ES	: 06
Additional information	: Information concerning technical function: Intermediate (precursor).

# Section 2 - Exposure controls

Contributing scenario control	llin	g environmental exposure for 1: Gas Sweetening	
Amounts used	: Daily amount per site: ≤0.5 tonnes/day. Annual amount per site: ≤50 tonnes/year.		
Other conditions affecting environmental exposure	:	Release factor after on-site risk management: water: 0.1% (ESVOC SPERC 7.13a.v1). Local release rate: 0.5 kg/day. air: 0.05% (ESVOC SPERC 7.13a.v1). Local release rate: 0.25 kg/day. Soil: 0.1% (ESVOC SPERC 7.13a.v1). Local release rate: 0 kg/day.	
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least: 0.031%). Discharge rate: ≥2000 m³/d. Application of the STP sludge on agricultural soil: Yes.	
Conditions and measures related to external treatment of waste for disposal	<ul> <li>s Disposal should be in accordance with applicable regional, national and local laws and regulations.</li> <li>This product should be treated as a hazardous waste according to EC Directive 2008/98/EC.</li> <li>Prevent entry into sewers, water courses, basements or confined areas.</li> </ul>		
Contributing scenario control	llin	g worker exposure for: All Contributing scenarios	
Product characteristics	:	Liquid with low viscosity. Weight fraction of substance in the article: 1. Vapour pressure (20°C): 5.255 Pa.	
Concentration of substance in mixture or article	:	Covers percentage substance in the product up to 100%.	
Other conditions affecting workers exposure	:	Indoor use. Operating temperature: ≤20°C.	
Date of issue/Date of revision		: 22/11/2022 <b>Version</b> : 3 / en 60/66	

N-Aminoethylpiperazine, AEF	2	Exposure Scenario: 06 Use at inc	dustrial sites.	
Organisational measures to prevent/limit releases.	:	Avoid all skin contact with product, clean u	up contamination/spills as soon as they	
dispersion and exposure		Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately.		
		Provide basic employee training to prevent/minimise exposures and to report any skin problems that may develop.		
		Avoid direct contact with the substance/mixture/product by establishing organisational measures.		
		Avoid splashing. Avoid contact with contaminated tools and objects		
		Regular cleaning of equipment.		
		Regular cleaning of work area. Supervision in place to check that the risk management measures in place are being		
		used correctly and operational conditions followed. Training for staff on good practice.		
Conditions and measures rela	ate	Good standard of personal hygiene.	ealth evaluation	
Personal protection	:	Use suitable eye protection.		
		Wear suitable gloves tested to EN374.		
Contributing scenario contro	llin	g worker exposure for 2: Storage		
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 hours. Exposure period, Distance of worker from	source > 1 m: 480 minutes.	
Other conditions affecting workers exposure	:	Room size: Any. Activities with open liquid surfaces or open surfaces (no aerosol formation). Open surface: > 3 m ³ .	reservoirs - activity with undisturbed	
Technical conditions and	:	The process is not fully enclosed or the int	tegrity of that enclosure is not regularly	
measures at process level (source) to prevent release		monitored. Demonstrable and effective housekeeping Containment - high. Effectiveness of contained	g practices are in place. ainment: 99.9%.	
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Managerr Store substance within a closed system. Assumes a good basic standard of occupa Provide a basic standard of general ventila Only good natural ventilation. ( <i>ART</i> )	nent System: Advanced. ational hygiene is implemented. ation (1 to 3 air changes per hour).	
Contributing scenario controlling worker exposure for 3: General exposures (closed systems); No sampling				
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 hours. Exposure period, Distance of worker from	source > 1 m: 480 minutes.	
Other conditions affecting workers exposure	:	Room size: 1000 m ³ . Activities with open liquid surfaces or open Open surface: > 3 m ³ .	reservoirs - activity with agitated surfaces.	
Technical conditions and measures at process level	:	The process is not fully enclosed or the int monitored.	tegrity of that enclosure is not regularly	
(source) to prevent release		Demonstrable and effective housekeeping Containment - high. Effectiveness of conta	g practices are in place. ainment: 99.9%.	
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safety Managerr Handle substance within a closed system. Assumes a good basic standard of occupa Provide a basic standard of general ventila Only good natural ventilation. ( <i>ART</i> )	nent System: Advanced. ational hygiene is implemented. ation (1 to 3 air changes per hour).	
Contributing scenario contro	llin	g worker exposure for 4: Polymerisation	n (closed systems); Continuous	
Frequency and duration of	:	Covers daily exposures up to 8 hours.		
use/exposure		Activity/Process 1: Exposure period, Distar minutes.	nce of worker from source < 1 m: 10	
		Activity/Process 2: Exposure period, Distar minutes. Activity/Process 3: Exposure period, Distar minutes.	nce of worker from source < 1 m: 50 nce of worker from source > 1 m: 420	
Date of issue/Date of revision		: 22/11/2022	Version : 3 / en 61/66	

N-Aminoethylpiperazine, AEF	•	Exposure Scenario: 06	Use at industrial sites.	
Other conditions affecting	:	Room size: 1000 m ³ .		
workers exposure		Activity/Process 1: Transfer of - Splash loading.	liquid products - falling liquids:	
		Activity/Process 2: Handling of - Activities with treated/contam - Contamination 10 - 90% of su	contaminated objects: inated objects (Surfaces: 1 - 3 m²). ırface.	
		Activity/Process 3: Activities wit agitated surfaces: - Open surface: > 3 m ³ .	h open liquid surfaces or open reservoirs - activity with	
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclos monitored.	ed or the integrity of that enclosure is not regularly	
		Activity/Process 1: Transfer of - General housekeeping practi - Transfer of liquid products - fa - Handling that reduces contact	liquid products - falling liquids: ces are in place. alling liquids: < 0.1 L/min. t between product and adjacent air.	
		Activity/Process 2: Handling of - Demonstrable and effective h	contaminated objects: nousekeeping practices are in place.	
		Activity/Process 3: Activities wit agitated surfaces: - Demonstrable and effective h	h open liquid surfaces or open reservoirs - activity with nousekeeping practices are in place.	
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Safe Handle substance within a clos Assumes a good basic standar Provide a basic standard of ge Only good natural ventilation. (	ty Management System: Advanced. Sed system. rd of occupational hygiene is implemented. neral ventilation (1 to 3 air changes per hour). ART)	
Conditions and measures rela	Conditions and measures related to personal protection. hygiene and health evaluation			
Personal protection	:	Use suitable eye protection. Wear chemical-resistant glove employee training. Dermal - m	s (tested to EN374) in combination with 'basic' inimum efficiency of 90%.	
Contributing scenario control With sample collection	Contributing scenario controlling worker exposure for 5: Polymerisation; Use in contained batch processes; With sample collection			
Frequency and duration of use/exposure	:	Covers daily exposures up to 8 Activity/Process 1: Exposure per minutes. Activity/Process 2: Exposure per minutes. Activity/Process 3: Exposure per minutes. Activity/Process 4: Exposure per minutes.	hours. eriod, Distance of worker from source < 1 m: 20 eriod, Distance of worker from source < 1 m: 60 eriod, Distance of worker from source > 1 m: 380 eriod, Distance of worker from source < 1 m: 20	
Other conditions affecting	:	Room size: 1000 m ³ .		
workers exposure		Activity/Process 1: Transfer of - Splash loading.	liquid products - falling liquids:	
		Activity/Process 2 / 4: Handling - Activities with treated/contam - Contamination 10 - 90% of su	of contaminated objects: inated objects (Surfaces: 1 - 3 m²). ırface.	
		Activity/Process 3: Activities wit agitated surfaces: - Open surface: > 3 m ³ .	h open liquid surfaces or open reservoirs - activity with	

N-Aminoethylpiperazine, AEP	Exposure Scenario: 06	Use at industrial sites.	
Technical conditions and measures at process level (source) to prevent release	: The process is not fully enclo monitored.	osed or the integrity of that enclosure is not regularly	
	Activity/Process 1: Transfer of liquid products - falling liquids: - General housekeeping practices are in place. - Transfer of liquid products - falling liquids: < 0.1 L/min. - Handling that reduces contact between product and adjacent air.		
	Activity/Process 2 / 4: Handling of contaminated objects: - Demonstrable and effective housekeeping practices are in place.		
	Activity/Process 3: Activities with open liquid surfaces or open reservoirs - activity with agitated surfaces: - Demonstrable and effective housekeeping practices are in place.		
	- Containment - high. Effectiv	reness of containment: 99.9%.	
Technical conditions and measures to control	: Occupational Health and Saf	ety Management System: Advanced. osed system	
dispersion from source towards the worker	Assumes a good basic stand Provide a basic standard of g Only good natural ventilation	ard of occupational hygiene is implemented. Jeneral ventilation (1 to 3 air changes per hour). . ( <i>ART</i> )	
Conditions and measures rela	ted to personal protection, hy	giene and health evaluation	
Personal protection	: Use suitable eye protection. Wear chemical-resistant glov employee training. Dermal -	ves (tested to EN374) in combination with 'basic' minimum efficiency of 90%.	
Contributing scenario controll	ing worker exposure for 6: B	ulk transfers; Dedicated facility	
Frequency and duration of use/exposure	: Covers exposure up to 4 hou Activity/Process 1: Exposure minutes.	rs. period, Distance of worker from source < 1 m: 20	
	Activity/Process 2: Exposure minutes.	period, Distance of worker from source > 1 m: 200	
	minutes. Non-exposure period: 240 m	inutes.	
Other conditions affecting	: Room size: 1000 m ³ .		
workers exposure	Activity/Process 1: Transfer c - Splash loading.	f liquid products - falling liquids:	
	Activity/Process 3: Handling - Activities with treated/contar - Contamination 10 - 90% of	of contaminated objects: ninated objects (Surfaces: 1 - 3 m²). surface.	
Technical conditions and measures at process level (source) to prevent release	: The process is not fully enclo monitored.	osed or the integrity of that enclosure is not regularly	
	Activity/Process 1: Transfer of - General housekeeping prace - Transfer of liquid products - - Handling that reduces conta	of liquid products - falling liquids: otices are in place. falling liquids: < 0.1 L/min. act between product and adjacent air.	
	Activity/Process 2: Transfer of - Demonstrable and effective - Transfer of liquid products -	of liquid products - Bottom loading: housekeeping practices are in place. Bottom loading: >1000 L/min.	
	Activity/Process 3: Handling of - Demonstrable and effective	of contaminated objects: housekeeping practices are in place.	
Technical conditions and measures to control dispersion from source towards the worker	: Occupational Health and Saf Assumes a good basic stand Provide a basic standard of g Only good natural ventilation	ety Management System: Advanced. ard of occupational hygiene is implemented. Jeneral ventilation (1 to 3 air changes per hour). J. ( <i>ART</i> )	
Conditions and measures rela	ted to personal protection, hy	giene and health evaluation	
Personal protection	: Use suitable eye protection. Wear chemical-resistant glov employee training. Dermal -	ves (tested to EN374) in combination with 'basic' minimum efficiency of 90%.	

N-Aminoethylpiperazine, AEP	)	Exposure Scenario: 06	Use at industrial sites.	
Contributing scenario controlling worker exposure for 7: Equipment cleaning and maintenance				
Frequency and duration of use/exposure	:	Covers exposure up to 2 hou Exposure period, Distance o Non-exposure period: 360 m	urs. of worker from source < 1 m: 120 minutes ninutes.	
Other conditions affecting workers exposure	:	Room size: Any. Handling of contaminated of Activities with treated/contam Contamination 10 - 90% of s	bjects. ninated objects (Surfaces: 1 - 3 m²). surface.	
Technical conditions and measures at process level (source) to prevent release	:	The process is not fully enclo monitored. Demonstrable and effective	osed or the integrity of that enclosure is n housekeeping practices are in place.	ot regularly
Technical conditions and measures to control dispersion from source towards the worker	:	Occupational Health and Sa Assumes a good basic stand Provide a basic standard of Only good natural ventilation	afety Management System: Advanced. dard of occupational hygiene is implemen general ventilation (1 to 3 air changes per n. ( <i>ART</i> )	ited. ⁻ hour).
Conditions and measures related to personal protection, hygiene and health evaluation				
Personal protection	:	Use suitable eye protection. Wear chemical-resistant glo employee training. Dermal -	oves (tested to EN374) in combination with minimum efficiency of 90%.	ו 'basic'

# Section 3 - Exposure estimation and reference to its source

Exposure estimation and re	erence to its source - Environment: 1: Gas Sweetening		
Exposure assessment (environment):	: EUSES v2.1.2.		
Exposure estimation: Freshwater: 0.042 mg/l. Risk characterisation ratio (PEC/PNEC): 0.718.			
	Freshwater sediment: 0.157 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01.		
	Marine water: 0.00416 mg/l. Risk characterisation ratio (PEC/PNEC): 0.717.		
	Marine water sediment: 0.016 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01.		
	Sewage Treatment Plant: 0.25 mg/l. Risk characterisation ratio (PEC/PNEC): <0.01.		
	Soil: 0.011 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): 0.011.		
Remark	: Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).		
Exposure estimation and reference to its source - Workers: 2: Storage			
Exposure assessment (human):	: Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.		
Exposure estimation	: Worker - inhalative, long-term - local: 0.000036 mg/m ³ . Risk characterisation ratio: < 0.01.		
	<b>Worker - dermal, long-term - systemic:</b> 0.034 mg/kg bw/day. Risk characterisation ratio: 0.01.		
Remark	: Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).		

N-Aminoethylpiperazine, AEF	2	Exposure Scenario: 06	Use at industrial sites.	
Exposure estimation and reference to its source - Workers: 3: General exposures (closed systems); No sampling				
Exposure assessment (human):	:	Inhalation exposure: Used ART model. Version 1.5. Dermal exposure: ECETOC TRA worker v3.		
Exposure estimation	:	<b>Worker - inhalative, long-term - local:</b> 0.0013 mg/m ³ . Risk characterisation ratio: 0.087.		
		Worker - dermal, long-term - Risk characterisation ratio: 0.01	<b>systemic:</b> 0.034 mg/kg bw/day. I.	
Remark	:	Based on the applied RMMs the < 1).	e risk towards humans is sufficiently controlled (RCR	
Exposure estimation and refe process: With sample collect	erei ion	nce to its source - Workers: 4:	Polymerisation (closed systems); Continuous	
Exposure assessment (human):	:	Inhalation exposure: Used ART Dermal exposure: ECETOC TF	[™] model. Version 1.5. RA worker v3.	
Exposure estimation	:	<b>Worker - inhalative, long-tern</b> Risk characterisation ratio: 0.18	<b>n - local:</b> 0.0027 mg/m³. 3.	
		Worker - dermal, long-term - Risk characterisation ratio: 0.04	<b>systemic:</b> 0.137 mg/kg bw/day. I1.	
Remark	:	Based on the applied RMMs the < 1).	e risk towards humans is sufficiently controlled (RCR	
Exposure estimation and refe processes: With sample colle	erei ecti	nce to its source - Workers: 5: on	Polymerisation; Use in contained batch	
Exposure assessment (human):	:	Inhalation exposure: Used ART Dermal exposure: ECETOC TF	model. Version 1.5. RA worker v3.	
Exposure estimation	:	Worker - inhalative, long-tern Risk characterisation ratio: 0.25	<b>n - local:</b> 0.0038 mg/m³. 53.	
		Worker - dermal, long-term - Risk characterisation ratio: 0.02	<b>systemic:</b> 0.069 mg/kg bw/day. 21.	
Remark	:	Based on the applied RMMs the < 1).	e risk towards humans is sufficiently controlled (RCR	
Exposure estimation and reference to its source - Workers: 6: Bulk transfers; Dedicated facility				
Exposure assessment (human):	:	Inhalation exposure: Used ART Dermal exposure: ECETOC TF	່ model. Version 1.5. RA worker v3.	
Exposure estimation	:	<b>Worker - inhalative, long-tern</b> Risk characterisation ratio: 0.22	<b>n - local:</b> 0.0034 mg/m³. 27.	
		Worker - dermal, long-term - Risk characterisation ratio: 0.41	<b>systemic:</b> 1.371 mg/kg bw/day.  2.	
Remark	:	Based on the applied RMMs the < 1).	e risk towards humans is sufficiently controlled (RCR	
Exposure estimation and refe	Exposure estimation and reference to its source - Workers: 7: Equipment cleaning and maintenance			
Exposure assessment (human):	:	Inhalation exposure: Used ART Dermal exposure: ECETOC TF	model. Version 1.5. RA worker v3.	
Exposure estimation	:	<b>Worker - inhalative, long-tern</b> Risk characterisation ratio: 0.30	<b>n - local:</b> 0.0046 mg/m³. )7.	
		Worker - dermal, long-term - Risk characterisation ratio: 0.41 Remarks: Exposure Estimation	<b>systemic:</b> 1.371 mg/kg bw/day.  2. : PROC08a	
Remark	:	Based on the applied RMMs the < 1).	e risk towards humans is sufficiently controlled (RCR	

# 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.