SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

ETHYLENEDIAMINE (EDA)

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

<table>
<thead>
<tr>
<th>Trade name</th>
<th>ETHYLENEDIAMINE (EDA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance name</td>
<td>Ethylenediamine</td>
</tr>
<tr>
<td>Index-No.</td>
<td>612-006-00-6</td>
</tr>
</tbody>
</table>

REACH Registration Number: 01-2119480383-37-0000

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

Use of the Substance/Mixture: Specific use(s): Refer to attached exposure scenario Annex.

1.3 Details of the supplier of the safety data sheet

Company: Akzo Nobel
Functional Chemicals AB
SE 444 85 Stenungsund
Sweden

Telephone: +4630385000
Telefax: +46303770551
E-mail address: CustomerService.Amin@akzonobel.com

1.4 Emergency telephone number

Emergency telephone number: 24 hours emergency response number: +31 57 06 79211
Kemiakuten-SE: 020 99 60 00

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)
Flammable liquids, 3, H226
Acute toxicity, 4, H302
Acute toxicity, 4, H332
Acute toxicity, 3, H311
Skin corrosion, 1B, H314
Serious eye damage, 1, H318
Respiratory sensitisation, 1B, H334
Skin sensitisation, 1B, H317
Chronic aquatic toxicity, 3, H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Pictogram:

Signal word: Danger

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

Precautionary statements:

Prevention:
- P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- P261 Avoid breathing mist, vapours or spray.
- P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
- P285 In case of inadequate ventilation wear respiratory protection.

Response:
- P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
- 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...
P342 + P311

If experiencing respiratory symptoms: Call a POISON CENTER/doctor.

Hazardous components which must be listed on the label:
Ethylenediamine 107-15-3

2.3 Other hazards

No further data available.

PBT and vPvB assessment: This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.
SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>PBT</th>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>REACH No.</th>
<th>Classification (REGULATION (EC) No 1272/2008)</th>
<th>Concentration [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylenediamine</td>
<td>107</td>
<td>107-15-3</td>
<td>203-468-6</td>
<td>01-2119480383-37</td>
<td>Flam. Liq. 3; H226 Acute Tox. 4; H302 Acute Tox. 4; H332 Acute Tox. 3; H311 Skin Corr. 1B; H314 Eye Dam. 1; H318 Resp. Sens. 1B; H334 Skin Sens. 1B; H317 Aquatic Chronic 3; H412</td>
<td>90 - 100</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).
Status : Not applicable

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

General advice : Immediate medical attention is required. Move out of dangerous area. Show this safety data sheet to the doctor in attendance. Symptoms of poisoning may appear several hours later.

If inhaled : If breathed in, move person into fresh air. Consult a physician after significant exposure.

In case of skin contact : Take off contaminated clothing and shoes immediately. Rinse immediately with plenty of water. Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty. Take victim immediately to hospital.

In case of eye contact : Rinse with plenty of water. Get medical attention immediately. Continue to rinse during transport. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing.
Small amounts splashed into eyes can cause irreversible tissue damage and blindness.

If swallowed:
- Clean mouth with water and drink afterwards plenty of water.
- Never give anything by mouth to an unconscious person.
- Take victim immediately to hospital.
- Do not induce vomiting! May cause chemical burns in mouth and throat.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms:
The symptoms and effects are as expected from the hazards as shown in section 2. No specific product related symptoms are known.

Risks:
- Harmful if swallowed or if inhaled
- Toxic in contact with skin.
- May cause an allergic skin reaction.
- Causes serious eye damage.
- May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- Causes severe burns.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment:
- Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media:
- Carbon dioxide (CO2)
- Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting/Specific hazards arising from the chemical:
- Water spray may be ineffective unless used by experienced firefighters.
- Do not allow run-off from fire fighting to enter drains or water courses.

Combustion products:
- Carbon oxides
- Nitrogen oxides (NOx)

5.3 Advice for firefighters

Special protective equipment for firefighters:
- In the event of fire, wear self-contained breathing apparatus.

Further information:
- Use water spray to cool unopened containers.
- Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
- Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
- For safety reasons in case of fire, cans should be stored separately in closed containments.
SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions: Use personal protective equipment. Wear respiratory protection. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

6.2 Environmental precautions

Environmental precautions: Prevent product from entering drains. If the product contaminates rivers and lakes or drains inform respective authorities.

6.3 Methods and materials for containment and cleaning up

Methods for cleaning up / Methods for containment: Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4 Reference to other sections

Additional advice: For personal protection see section 8.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Advice on safe handling: Persons with a history of skin sensitisation problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.

Advice on protection against fire and explosion: Avoid formation of aerosol. Keep away from sources of ignition - No smoking. No sparking tools should be used. Take measures to prevent the build up of electrostatic charge.
7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers:
- Prevent unauthorized access.
- No smoking.
- Keep container tightly closed in a dry and well-ventilated place.
- Reacts with copper, aluminium, zinc and their alloys.
- Electrical installations / working materials must comply with the technological safety standards.

Other data:
- No decomposition if stored and applied as directed.

7.3 Specific end use(s)

Specific use(s):
- Refer to attached exposure scenario Annex.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006

<table>
<thead>
<tr>
<th>Substance name</th>
<th>End Use</th>
<th>Exposure routes</th>
<th>Potential health effects</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylenediamine</td>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>25 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Workers</td>
<td>Skin contact</td>
<td>Long-term systemic effects</td>
<td>3.6 mg/kg bw/day</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>12.5 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Oral</td>
<td>Long-term systemic effects</td>
<td>0.275 mg/kg bw/day</td>
</tr>
</tbody>
</table>

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006

<table>
<thead>
<tr>
<th>Substance name</th>
<th>Environmental Compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylenediamine</td>
<td>Fresh water</td>
<td>0.016 mg/l</td>
</tr>
<tr>
<td></td>
<td>Marine water</td>
<td>0.002 mg/l</td>
</tr>
<tr>
<td></td>
<td>Intermittent use/release</td>
<td>0.167 mg/l</td>
</tr>
<tr>
<td></td>
<td>Fresh water sediment</td>
<td>7.68 mg/kg dry weight</td>
</tr>
<tr>
<td></td>
<td>Marine sediment</td>
<td>0.768 mg/kg dry weight</td>
</tr>
<tr>
<td></td>
<td>Soil</td>
<td>4.36 mg/kg dry weight</td>
</tr>
<tr>
<td></td>
<td>Sewage treatment plant</td>
<td>0.5 mg/l</td>
</tr>
<tr>
<td></td>
<td>Secondary Poisoning</td>
<td>4.9 mg/kg food</td>
</tr>
</tbody>
</table>
8.2 Exposure controls

**Engineering controls**
Effective exhaust ventilation system.
Ensure that eyewash stations and safety showers are close to the workstation location.

**Personal protective equipment**
- **Respiratory protection**: In the case of vapour or aerosol formation use a respirator with an approved filter. Wear full face mask supplied with: Gas cartridge K (ammonia, green).
- **Hand protection**: butyl-rubber
- **Eye protection**: Safety glasses with side-shields conforming to EN166
- **Skin and body protection**: Protective suit
- **Hygiene measures**: Avoid contact with skin, eyes and clothing. When using do not eat or drink. When using do not smoke. Wash hands before breaks and immediately after handling the product. Wash contaminated clothing before re-use.

**Environmental exposure controls**
- **General advice**: Prevent product from entering drains. If the product contaminates rivers and lakes or drains inform respective authorities.

**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

9.1 Information on basic physical and chemical properties

**Appearance**
- **Form**: viscous liquid
- **Colour**: colourless
- **Light yellow
- **Odour**: ammoniacal
- **Odour Threshold**: No data available

**Safety data**
- **pH**: 12.8 at 25 % solution
- **Melting point/range**: 11 °C at 1,013 hPa
- **Boiling point/boiling range**: 117 °C
Flash point: 38 °C at 1,013 hPa
Method: closed cup

Ignition temperature: > 300 °C

Evaporation rate: No data available

Flammability (solid, gas): Not applicable

Flammability (liquids): Flammable liquid and vapour.

Lower explosion limit: 2 %(V)
Upper explosion limit: 17 %(V)

Vapour pressure: 17.3 hPa at 26.6 °C

Relative vapour density: 2.1

Density: 895 kg/m³ at 20 °C

Relative density: 897 at 20 °C

Water solubility: completely miscible

Solubility in other solvents: Very soluble in ethanol and benzene.

Partition coefficient: n-octanol/water: log Pow: -1.6 at 20 °C

Auto-ignition temperature: 385 - 405 °C at 1,013 hPa

Decomposition temperature: No data available

Viscosity, dynamic: 1.265 mPa.s at 25 °C

Viscosity, kinematic: No data available

Explosive properties: Not explosive

Oxidizing properties: The substance or mixture is not classified as oxidizing.

9.2 Other information
This safety datasheet only contains information relating to safety and does not replace any product information or product specification.

SECTION 10: STABILITY AND REACTIVITY
10.1 Reactivity
Stable under normal conditions.

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Heating can release hazardous gases.

10.4 Conditions to avoid
Conditions to avoid : Heat, flames and sparks.

10.5 Incompatible materials
Materials to avoid : Reacts with copper, aluminium, zinc and their alloys.
Strong acids and oxidizing agents
Halogenated compounds

10.6 Hazardous decomposition products
Hazardous decomposition products : Nitrogen oxides (NOx)
Thermal decomposition : No data available

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects
Product information:
Acute toxicity : Harmful if swallowed or if inhaled
               Toxic in contact with skin.
Skin corrosion/irritation : Causes severe burns.
Serious eye damage/eye irritation : Causes serious eye damage.
Respiratory or skin sensitisation : Respiratory sensitisation: May cause allergy or asthma symptoms or breathing difficulties if inhaled.
               Skin sensitisation: May cause an allergic skin reaction.
Germ cell mutagenicity : Not classified based on available information.
Carcinogenicity : Not classified based on available information.
Reproductive toxicity : Not classified based on available information.
STOT - single exposure : Not classified based on available information.
STOT - repeated exposure : Not classified based on available information.
Aspiration hazard : Not classified based on available information.
Further information : Solvents may degrease the skin.
Toxicology data for the components:
ETHYLENEDIAMINE (EDA)

Acute toxicity:
Acute oral toxicity: LD50: > 300 - 2,000 mg/kg
Species: Rat

Acute inhalation toxicity: LC50 (Rat): > 10 - 20 mg/l
Exposure time: 4 h
Test atmosphere: vapour

Acute dermal toxicity: LD50: > 200 - 1,000 mg/kg
Species: Rabbit

Skin corrosion/irritation: Result: Causes burns.

Serious eye damage/eye irritation:
Result: Risk of serious damage to eyes.

Respiratory or skin sensitisation:
Result: The product is a skin sensitiser, sub-category 1B.
Result: The product is a respiratory sensitiser, sub-category 1B.

Germ cell mutagenicity:
Genotoxicity in vitro: Result: Not mutagenic.
Positive results were obtained in some in vitro tests.

Genotoxicity in vivo: Result:
No evidence of genotoxic effects in vivo.

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

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

STOT - single exposure:
Based on available data, the classification criteria are not met.

STOT - repeated exposure:
Based on available data, the classification criteria are not met.

Aspiration hazard: No data available

SECTION 12: ECOLOGICAL INFORMATION

Product information:
Ecotoxicology Assessment:

Additional ecological information:
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Harmful to aquatic life with long lasting effects.
12.1 Toxicity

Components: Ecotoxicology Assessment
Ethlenediamine
Acute aquatic toxicity: Harmful to aquatic life.
Chronic aquatic toxicity: Harmful to aquatic life with long lasting effects.

Test result
Ethlenediamine
Toxicity to fish: LC50: > 100 mg/l
Exposure time: 96 h
Species: Poecilia reticulata (guppy)

Toxicity to daphnia and other aquatic invertebrates: EC50: > 10 - 100 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)

Toxicity to algae: EC50: > 100 mg/l
Exposure time: 72 h
Species: Pseudokirchneriella subcapitata (green algae)

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity): NOEC: > 0.1 - 1 mg/l
Exposure time: 21 d
Species: Daphnia magna (Water flea)

12.2 Persistence and degradability

Product information: Biodegradability
Result: Readily biodegradable

Components: Ethlenediamine
Biodegradability: Result: Readily biodegradable
>60% BOD, 28 days, Closed Bottle Test (OECD 301D).

12.3 Bioaccumulative potential

Product information: Bioaccumulation
Not expected considering the low log Pow value.

Components: Ethlenediamine
Bioaccumulation: Not expected considering the low log Pow value.

12.4 Mobility in soil

Product information: Mobility
Adsorption to solid soil phase is possible.

Components: Ethlenediamine
Mobility: Adsorption to solid soil phase is possible.
Groundwater contamination is unlikely. Transport to air is not expected.

12.5 Results of PBT and vPvB assessment

**Product information:**

- **PBT and vPvB assessment**: This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

**Components:**

- **Ethylenediamine**
  - **PBT and vPvB assessment**: This substance is not considered to be a PBT (Persistent, Bioaccumulation, Toxic)
  - This substance is not considered to be vPvB (very Persistent nor very Bioaccumulating)

12.6 Other adverse effects

**Product information:**

- **Biochemical Oxygen Demand (BOD)**: No data available

**Components:**

- **Ethylenediamine**
  - **Biochemical Oxygen Demand (BOD)**: No data available

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

**Product**

- The product should not be allowed to enter drains, water courses or the soil.
- Do not contaminate ponds, waterways or ditches with chemical or used container.
- Hazardous waste
- Dispose of contents/container in accordance with local regulation.

**Contaminated packaging**

- Empty remaining contents.
- Dispose of as unused product.
- Do not burn, or use a cutting torch on, the empty drum.

SECTION 14: TRANSPORT INFORMATION

14.1 UN number

- **ADR**: UN 1604
- **RID**: UN 1604
- **IMDG-Code**: UN 1604
- **IATA-DGR**: UN 1604

14.2 Proper shipping name

- **ADR**: ETHYLENEDIAMINE
- **RID**: ETHYLENEDIAMINE
IMDG-Code : ETHYLENEDIAMINE
IATA-DGR : Ethylenediamine

14.3 Transport hazard class

ADR : 8 (3)
RID : 8 (3)
IMDG-Code : 8 (3)
IATA-DGR : 8 (3)

14.4 Packing group

ADR
Packing group : II
Classification Code : CF1
Hazard Identification Number : 83
Labels : 8 (3)
Tunnel restriction code : (D/E)

RID
Packing group : II
Classification Code : CF1
Hazard Identification Number : 83
Labels : 8 (3)
IMDG-Code
Packing group : II
Labels : 8 (3)
EmS Code : F-E, S-C

14.5 Environmental hazards

ADR
Environmentally hazardous : no

RID
Environmentally hazardous : no

IMDG-Code
Marine pollutant : no

14.6 Special precautions for user
Not applicable

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable for product as supplied.
SECTION 15: REGULATORY INFORMATION

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

- Major Accident Hazard Legislation: Seveso Directive 2012/18/EU
  - FLAMMABLE LIQUIDS
  - Quantity 1: 5,000 t
  - Quantity 2: 50,000 t

- Water contaminating class (Germany): WGK 1 slightly water endangering

Notification status

- TSCA: YES. All chemical substances in this product are either listed on the TSCA Inventory or in compliance with a TSCA Inventory exemption.
- DSL: YES. All components of this product are on the Canadian DSL
- AICS: YES. On the inventory, or in compliance with the inventory
- NZIoC: YES. On the inventory, or in compliance with the inventory
- ENCS: YES. On the inventory, or in compliance with the inventory
- ISHL: YES. On the inventory, or in compliance with the inventory
- KECl: YES. On the inventory, or in compliance with the inventory
- PICCS: YES. On the inventory, or in compliance with the inventory
- IECSC: YES. On the inventory, or in compliance with the inventory

For explanation of abbreviation see section 16.

Further information

This product is to be considered as a substance according to EU-legislation.

15.2 Chemical safety assessment

- Ethylenediamine: A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

- H226: Flammable liquid and vapour.
- H302: Harmful if swallowed.
- H311: Toxic in contact with skin.
- H314: Causes severe skin burns and eye damage.
- H317: May cause an allergic skin reaction.
- H318: Causes serious eye damage.
- H332: Harmful if inhaled.
- H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- H412: Harmful to aquatic life with long lasting effects.
Full text of other abbreviations

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road; AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSR - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

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The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
Annex:

- Use as an intermediate
- Industrial formulation
- Industrial use as a Processing aid
- Industrial use, Processing aid / Scavenging agent in refinery streams / Corrosion inhibitors
- Heat and pressure transfer fluids in dispersive, professional use but closed systems
- Monomer use in epoxy, PU, adhesives, coatings and other polymers, Industrial
- Monomer use in epoxy, PU, adhesives, coatings and other polymers, Professional
1. Short title of Exposure Scenario: Use as an intermediate

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Environmental Release Categories: ERC6a, ERC6c: Industrial use resulting in manufacture of another substance (use of intermediates), Industrial use of monomers for manufacture of thermoplastics

Process categories:
- PROC1: Use in closed process, no likelihood of exposure
- PROC2: Use in closed, continuous process with occasional controlled exposure
- PROC3: Use in closed batch process (synthesis or formulation)
- PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
- PROC15: Use as laboratory reagent

2.1 Contributing scenario controlling environmental exposure for: ERC6a, ERC6c: Industrial use resulting in manufacture of another substance (use of intermediates), Industrial use of monomers for manufacture of thermoplastics

Amount used
- Maximum daily site tonnage: 5000 kg/day
- Fraction of EU tonnage used in region: 100%
- Fraction of Regional tonnage used locally: 1%

Environment factors not influenced by risk management
- Flow rate: 18,000 m3/day
- Dilution Factor (River): 10
- Dilution Factor (Coastal Areas): 100

Other given operational conditions affecting environmental exposure
- Number of emission days per year: 220
- Emission or Release Factor: Air: 0.1%
- Emission or Release Factor: Water: 0.7%
- Emission or Release Factor: Soil: 0%
- Additional Risk Management: 92%
- Measures for water
- Remarks: For example, Incineration, ion exchange processes

Technical conditions and measures / Organizational measures
- Exposure time: Continuous use/release

Conditions and measures related to municipal sewage treatment plant
Type of Sewage Treatment Plant: Sewage treatment plant
Flow rate of sewage treatment plant effluent: 2,000 m³/day
Percentage removed from wastewater: 90.4%

### 2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

<table>
<thead>
<tr>
<th>Activity</th>
<th>General exposures, (closed systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100% (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Exposure duration</td>
<td>&gt; 240 min</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
</tbody>
</table>

Human factors not influenced by risk management:
Dermal exposure: Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure:
Outdoor / Indoor: Indoor
Outdoor / Indoor: Outdoor

Organisational measures to prevent/limit releases, dispersion and exposure:
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation:
Use suitable eye protection. Wear suitable coveralls to prevent exposure to the skin. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness of a measure): 95 %

### 2.3 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

<table>
<thead>
<tr>
<th>Activity</th>
<th>General exposures, Continuous process, (open systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100% (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Exposure duration</td>
<td>&gt; 240 min</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
</tbody>
</table>

Human factors not influenced by risk management:
Dermal exposure: Palms of both hands (480 cm²)
Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Technical conditions and measures

Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)

Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.4 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Use in contained batch processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Exposure duration</td>
<td>&gt; 240 min</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
<tr>
<td>Human factors not influenced by risk management</td>
<td></td>
</tr>
<tr>
<td>Dermal exposure</td>
<td>Palm of one hand (240 cm²)</td>
</tr>
</tbody>
</table>

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Technical conditions and measures

Local exhaust ventilation is required at any step if there is opportunity for significant exposure. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable coveralls to prevent exposure to the skin., Use suitable eye protection.

Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
2.5 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

<table>
<thead>
<tr>
<th>Activity</th>
<th>Use in contained batch processes, Process sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Exposure duration</td>
<td>&gt; 240 min</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
<tr>
<td>Human factors not influenced by risk management</td>
<td></td>
</tr>
<tr>
<td>Dermal exposure</td>
<td>Palms of both hands (480 cm2)</td>
</tr>
<tr>
<td>Other operational conditions affecting workers exposure</td>
<td>Indoor</td>
</tr>
<tr>
<td>Technical conditions and measures</td>
<td></td>
</tr>
<tr>
<td>Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)</td>
<td></td>
</tr>
<tr>
<td>Organisational measures to prevent /limit releases, dispersion and exposure</td>
<td>Assumes a good basic standard of occupational hygiene is implemented.</td>
</tr>
<tr>
<td>Conditions and measures related to personal protection, hygiene and health evaluation</td>
<td></td>
</tr>
<tr>
<td>Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Activity</th>
<th>Laboratory activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Exposure duration</td>
<td>&lt; 240 min</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
<tr>
<td>Human factors not influenced by risk management</td>
<td></td>
</tr>
<tr>
<td>Dermal exposure</td>
<td>Palm of one hand (240 cm2)</td>
</tr>
<tr>
<td>Other operational conditions affecting workers exposure</td>
<td>Indoor</td>
</tr>
</tbody>
</table>
Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness of a measure): 90 %

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness of a measure): 95 %

3. Exposure estimation and reference to its source

Environment

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartme nt</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC6a</td>
<td>EUSES</td>
<td>Fresh water</td>
<td></td>
<td>0.014 mg/L</td>
<td></td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td></td>
<td>6.613 mg/kg dry weight</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine water</td>
<td></td>
<td>0.001 mg/L</td>
<td></td>
<td>0.688</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine sediment</td>
<td></td>
<td>0.66 mg/kg dry weight</td>
<td>0.859</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sewage treatment plant</td>
<td></td>
<td>0.134 mg/L</td>
<td></td>
<td>0.269</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil</td>
<td></td>
<td>1.176 mg/kg dry weight</td>
<td>0.27</td>
<td></td>
</tr>
</tbody>
</table>

Workers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>0.025 mg/m3</td>
<td></td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.002 mg/kg bw/day</td>
<td></td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>PROC2</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>1.252 mg/m3</td>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.068 mg/kg bw/day</td>
<td>0.019</td>
<td></td>
</tr>
<tr>
<td>PROC3</td>
<td>ECETOC TRA</td>
<td>Long term inhalation</td>
<td>2.504 mg/m3</td>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.034 mg/kg bw/day</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
</tbody>
</table>
ETHYLENEDIAMINE (EDA)

<table>
<thead>
<tr>
<th>PROC4</th>
<th>ECETOC TRA v3.0</th>
<th>Long term inhalation</th>
<th>5.008 mg/m³</th>
<th>0.2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.343 mg/kg bw/day</td>
<td>0.095</td>
</tr>
<tr>
<td>PROC15</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>1.502 mg/m³</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.01 mg/kg bw/day</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)
ERC6c: Industrial use of monomers for manufacture of thermoplastics
PROC1: Use in closed process, no likelihood of exposure
PROC15: Use as laboratory reagent
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

For further information, please also consult our Internet site: Downstream Users http://guidance.echa.europa.eu/downstream_users_en.htm
1. Short title of Exposure Scenario: Industrial formulation

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Environmental Release Categories: ERC2: Formulation of preparations

Process categories:
- PROC3: Use in closed batch process (synthesis or formulation)
- PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
- PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
- PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
- PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
- PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
- PROC15: Use as laboratory reagent

2.1 Contributing scenario controlling environmental exposure for: ERC2: Formulation of preparations

Amount used
- Maximum daily site tonnage (kg/day): 6300 kg/day
- Fraction of EU tonnage used in region: 100 %
- Fraction of Regional tonnage used locally: 10 %

Environment factors not influenced by risk management
- Flow rate: 18,000 m³/day
- Dilution Factor (River): 10
- Dilution Factor (Coastal Areas): 100

Other given operational conditions affecting environmental exposure
- Number of emission days per year: 220
- Emission or Release Factor: Air: 0.03 %
- Emission or Release Factor: Water: 0.05 %
- Emission or Release Factor: Soil: 0.01 %
- Remarks: spERC: ESVOC SpERC 2.2.v1
- Additional Risk Management: 90 %
Measures for water
Remarks : For example, ion exchange processes, Incineration

Technical conditions and measures / Organizational measures
Exposure time : Continuous use/release

Conditions and measures related to municipal sewage treatment plant
Type of Sewage Treatment Plant : Sewage treatment plant
Flow rate of sewage treatment plant effluent : 2,000 m3/day
Percentage removed from wastewater : 90.4 %

2.2 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Activity : Use in contained batch processes
Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use) : liquid

Frequency and duration of use
Exposure duration : > 240 min
Frequency of use : <= 240 days/year

Human factors not influenced by risk management
Dermal exposure : Palm of one hand (240 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Exposure routes
Inhalation exposure, Dermal exposure

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.
### 2.3 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

<table>
<thead>
<tr>
<th>Activity</th>
<th>Use in contained batch processes, Process sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100% (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Exposure duration</td>
<td>&gt; 240 min</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
<tr>
<td>Human factors not influenced by risk management</td>
<td></td>
</tr>
<tr>
<td>Dermal exposure</td>
<td>Palms of both hands (480 cm²)</td>
</tr>
<tr>
<td>Other operational conditions affecting workers exposure</td>
<td></td>
</tr>
<tr>
<td>Outdoor / Indoor</td>
<td>Indoor</td>
</tr>
</tbody>
</table>

**Technical conditions and measures**
- Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)

**Organisational measures to prevent/limit releases, dispersion and exposure**
- Assumes a good basic standard of occupational hygiene is implemented.

**Conditions and measures related to personal protection, hygiene and health evaluation**
- Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.
- Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)

### 2.4 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Use in contained batch processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100% (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Exposure duration</td>
<td>&gt; 240 min</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
<tr>
<td>Human factors not influenced by risk management</td>
<td></td>
</tr>
<tr>
<td>Dermal exposure</td>
<td>Palms of both hands (480 cm²)</td>
</tr>
<tr>
<td>Other operational conditions affecting workers exposure</td>
<td></td>
</tr>
</tbody>
</table>
ETHYLENEDIAMINE (EDA)

Outdoor / Indoor: Indoor
Ventilation rate per hour: 1
Remarks: Any, Room size

Exposure routes
Inhalation exposure, Dermal exposure

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 50 %)
Use in contained systems (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.5 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

<table>
<thead>
<tr>
<th>Activity characteristics</th>
<th>Drum/batch transfers, Bulk transfers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Duration of the activity</td>
<td>&lt; 15 min</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
<tr>
<td>Human factors not influenced by risk management</td>
<td></td>
</tr>
<tr>
<td>Dermal exposure</td>
<td>Both hands (960 cm2)</td>
</tr>
<tr>
<td>Other operational conditions affecting workers exposure</td>
<td></td>
</tr>
<tr>
<td>Outdoor / Indoor</td>
<td>Outdoor</td>
</tr>
<tr>
<td>Mass transfer rate</td>
<td>1 - 10 L/min</td>
</tr>
<tr>
<td>Exposure routes</td>
<td>Inhalation exposure, Dermal exposure</td>
</tr>
</tbody>
</table>

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.6 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Drum/batch transfers, Bulk transfers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Duration of the activity</td>
<td>1 - 4 h</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
<tr>
<td>Human factors not influenced by risk management</td>
<td></td>
</tr>
<tr>
<td>Dermal exposure</td>
<td>Palms of both hands (480 cm²)</td>
</tr>
<tr>
<td>Other operational conditions affecting workers exposure</td>
<td></td>
</tr>
<tr>
<td>Indoor/Outdoor</td>
<td>Indoor</td>
</tr>
<tr>
<td>Exposure routes</td>
<td>Inhalation exposure, Dermal exposure</td>
</tr>
</tbody>
</table>

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 95 %)

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.7 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Activity: Drum and small package filling, Small package filling

Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.

Physical Form (at time of use): liquid

Frequency and duration of use
- Exposure duration: 1 - 4 h
- Frequency of use: <= 240 days/year

Human factors not influenced by risk management
- Dermal exposure: Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure
- Outdoor / Indoor: Indoor

Exposure routes
- Inhalation exposure, Dermal exposure

Technical conditions and measures
- Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure
- Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
- Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
- Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

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

Activity: Laboratory activities

Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use): liquid

Frequency and duration of use
- Exposure duration: < 240 min
- Frequency of use: <= 240 days/year

Human factors not influenced by risk management
- Dermal exposure: Palm of one hand (240 cm²)
Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)

3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Environment</th>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartme nt</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC2</td>
<td>EUSES</td>
<td>Fresh water</td>
<td></td>
<td></td>
<td>0.015 mg/L</td>
<td>0.965</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td></td>
<td></td>
<td>7.414 mg/kg dry weight</td>
<td>0.965</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine water</td>
<td></td>
<td></td>
<td>0.002 mg/L</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine sediment</td>
<td></td>
<td></td>
<td>0.74 mg/kg dry weight</td>
<td>0.965</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sewage treatment plant</td>
<td></td>
<td></td>
<td>0.151 mg/L</td>
<td>0.302</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil</td>
<td></td>
<td></td>
<td>1.322 mg/kg dry weight</td>
<td>0.303</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Workers</th>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC3</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td></td>
<td>2.504 mg/m3</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td></td>
<td>0.034 mg/kg bw/day</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td>PROC4</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td></td>
<td>5.008 mg/m3</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td></td>
<td>0.343 mg/kg bw/day</td>
<td>0.095</td>
<td></td>
</tr>
<tr>
<td>PROC</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>Long term dermal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>-------------------</td>
<td>----------------------</td>
<td>------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC5</td>
<td>ECETOC TRA v3.0</td>
<td>2.6 mg/m³</td>
<td>0.686 mg/kg bw/day</td>
<td>0.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC8a</td>
<td>ART</td>
<td>3.1 mg/m³</td>
<td>0.069 mg/kg bw/day</td>
<td>0.019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC8b</td>
<td>ECETOC TRA v3.0</td>
<td>1.878 mg/m³</td>
<td>0.411 mg/kg bw/day</td>
<td>0.114</td>
<td></td>
<td></td>
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<tr>
<td>PROC9</td>
<td>ECETOC TRA v3.0</td>
<td>1.502 mg/m³</td>
<td>0.041 mg/kg bw/day</td>
<td>0.011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC15</td>
<td>ECETOC TRA v3.0</td>
<td>1.502 mg/m³</td>
<td>0.01 mg/kg bw/day</td>
<td>&lt; 0.01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ERC2: Formulation of preparations
PROC15: Use as laboratory reagent
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)
PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

For further information, please also consult our Internet site: Downstream Users
1. Short title of Exposure Scenario: Industrial use as a Processing aid

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Environmental Release Categories:
- ERC4, ERC7: Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use of substances in closed systems

Process categories:
- PROC1: Use in closed process, no likelihood of exposure
- PROC2: Use in closed, continuous process with occasional controlled exposure
- PROC3: Use in closed batch process (synthesis or formulation)

2.1 Contributing scenario controlling environmental exposure for: ERC4, ERC7: Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use of substances in closed systems

Amount used
- Maximum daily site tonnage (kg/day): 500 kg/day
- Fraction of EU tonnage used in region: 100%
- Fraction of Regional tonnage used locally: 0.046%

Environment factors not influenced by risk management
- Flow rate: 18,000 m³/day
- Dilution Factor (River): 10
- Dilution Factor (Coastal Areas): 100

Other given operational conditions affecting environmental exposure
- Number of emission days per year: 20
- Emission or Release Factor: Air: 1%
- Emission or Release Factor: Water: 0.01%
- Emission or Release Factor: Soil: 0.1%
- Remarks: ESVOC SpERC 7.13a.v1

Technical conditions and measures / Organizational measures
- Exposure time: Continuous use/release
- Compartment: Fresh water, Fresh water sediment, Marine water, Marine sediment, Soil, Grassland, Sewage treatment plant

Conditions and measures related to municipal sewage treatment plant
- Type of Sewage Treatment Plant: Sewage treatment plant
- Flow rate of sewage treatment plant effluent: 2,000 m³/day
Percentage removed from waste water: 90.4 %

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Activity: General exposures, (closed systems)
Product characteristics:
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.
- Physical Form (at time of use): liquid

Frequency and duration of use:
- Exposure duration: > 240 min
- Remarks: Inhalation, Dermal
- Frequency of use: ≤ 240 days/year

Human factors not influenced by risk management:
- Dermal exposure: Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure:
- Outdoor / Indoor: Indoor
- Outdoor / Indoor: Outdoor

Exposure routes:
- Inhalation exposure, Dermal exposure

Organisational measures to prevent /limit releases, dispersion and exposure:
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation:
- Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness (of a measure): 90 %)
- Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.3 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Activity: General exposures, Continuous process, (open systems)
Product characteristics:
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.
- Physical Form (at time of use): liquid

Frequency and duration of use:
- Exposure duration: > 240 min
- Frequency of use: ≤ 240 days/year
Human factors not influenced by risk management

Dermal exposure: Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor: Indoor
Outdoor / Indoor: Outdoor

Exposure routes

Inhalation exposure, Dermal exposure

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.4 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Activity: Use in contained batch processes

Product characteristics

Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.
Physical Form (at time of use): liquid

Frequency and duration of use

Exposure duration: > 240 min
Frequency of use: <= 240 days/year

Human factors not influenced by risk management

Dermal exposure: Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor: Indoor
Outdoor / Indoor: Outdoor

Exposure routes

Inhalation exposure, Dermal exposure

Technical conditions and measures

Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)
Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

3. Exposure estimation and reference to its source

**Environment**

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartme nt</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC4</td>
<td>EUSES</td>
<td>Fresh water</td>
<td></td>
<td>0.0007 mg/L</td>
<td>0.041</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td></td>
<td>0.318 mg/kg dry weight</td>
<td>0.041</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine water</td>
<td></td>
<td>&lt; 0.0001 mg/L</td>
<td>0.033</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine sediment</td>
<td></td>
<td>0.031 mg/kg dry weight</td>
<td>0.041</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sewage treatment plant</td>
<td></td>
<td>0.002 mg/L</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil</td>
<td></td>
<td>0.022 mg/kg dry weight</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
</tbody>
</table>

**Workers**

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>0.015 mg/m3</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.002 mg/kg bw/day</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td>PROC2</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>7.512 mg/m3</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.041 mg/kg bw/day</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>PROC3</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>1.502 mg/m3</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.021 mg/kg bw/day</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
</tbody>
</table>

ERC4: Industrial use of processing aids in processes and products, not becoming part of articles
ERC7: Industrial use of substances in closed systems
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

For further information, please also consult our Internet site: Downstream Users
1. Short title of Exposure Scenario: Industrial use, Processing aid / Scavenging agent in refinery streams / Corrosion inhibitors

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Environmental Release Categories: ERC4, ERC7: Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use of substances in closed systems

Process categories: PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation)

2.1 Contributing scenario controlling environmental exposure for: ERC4, ERC7: Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use of substances in closed systems

Amount used:
- Maximum daily site tonnage (kg/day): 6000 kg/day
- Fraction of EU tonnage used in region: 100%
- Fraction of Regional tonnage used locally: 10%

Environment factors not influenced by risk management:
- Flow rate: 18,000 m³/day
- Dilution Factor (River): 10
- Dilution Factor (Coastal Areas): 100

Other given operational conditions affecting environmental exposure:
- Number of emission days per year: 365
- Emission or Release Factor: Air: 0.25%
- Emission or Release Factor: Water: 0.001%
- Emission or Release Factor: Soil: 0.0%

Remarks: spERC: ESVOC SpERC 7.12a.v1

Technical conditions and measures / Organizational measures:
- Exposure time: Continuous use/release
- Compartment: Fresh water, Fresh water sediment, Marine water, Marine sediment, Soil, Grassland, Sewage treatment plant

Conditions and measures related to municipal sewage treatment plant:
- Type of Sewage Treatment Plant: Sewage treatment plant
Flow rate of sewage treatment plant effluent: 2,000 m³/day
Percentage removed from waste water: 90.4 %

### 2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

<table>
<thead>
<tr>
<th>Activity</th>
<th>General exposures, (closed systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 25 %.</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Exposure duration</td>
<td>&gt; 240 min</td>
</tr>
<tr>
<td>Remarks</td>
<td>Inhalation, Dermal</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
<tr>
<td>Human factors not influenced by risk management</td>
<td>Palm of one hand (240 cm²)</td>
</tr>
<tr>
<td>Dermal exposure</td>
<td>Palm of one hand (240 cm²)</td>
</tr>
<tr>
<td>Other operational conditions affecting workers exposure</td>
<td></td>
</tr>
<tr>
<td>Outdoor / Indoor</td>
<td>Indoor</td>
</tr>
<tr>
<td>Outdoor / Indoor</td>
<td>Outdoor</td>
</tr>
<tr>
<td>Exposure routes</td>
<td></td>
</tr>
<tr>
<td>Inhalation exposure, Dermal exposure</td>
<td></td>
</tr>
</tbody>
</table>

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness (of a measure): 90 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

### 2.3 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

<table>
<thead>
<tr>
<th>Activity</th>
<th>General exposures, Continuous process, (open systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 25 %.</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
</tbody>
</table>
ETHYLENEDIAMINE (EDA)

Exposure duration: > 240 min
Frequency of use: <= 240 days/year

Human factors not influenced by risk management
Dermal exposure: Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor
Outdoor / Indoor: Outdoor

Exposure routes
Inhalation exposure, Dermal exposure

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness of a measure): 95 %
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.4 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Activity: Use in contained batch processes
Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.
Physical Form (at time of use): liquid

Frequency and duration of use
Exposure duration: > 240 min
Frequency of use: <= 240 days/year

Human factors not influenced by risk management
Dermal exposure: Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor
Outdoor / Indoor: Outdoor

Exposure routes
Inhalation exposure, Dermal exposure

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness of a measure):
90 %)

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness of a measure): 95 %
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Environment</th>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartments</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC4</td>
<td>EUSES</td>
<td>Fresh water</td>
<td></td>
<td></td>
<td>&lt; 0.0001 mg/L</td>
<td>0.042</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td></td>
<td></td>
<td>0.341 mg/kg dry weight</td>
<td>0.044</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine water</td>
<td></td>
<td></td>
<td>&lt; 0.0001 mg/L</td>
<td>0.035</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine sediment</td>
<td></td>
<td></td>
<td>0.034 mg/kg dry weight</td>
<td>0.044</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sewage treatment plant</td>
<td></td>
<td></td>
<td>0.003 mg/L</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil</td>
<td></td>
<td></td>
<td>0.027 mg/kg dry weight</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Workers</th>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td></td>
<td>0.015 mg/m3</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td></td>
<td>0.002 mg/kg bw/day</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td>PROC2</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td></td>
<td>7.512 mg/m3</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td></td>
<td>0.041 mg/kg bw/day</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>PROC3</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td></td>
<td>1.502 mg/m3</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td></td>
<td>0.021 mg/kg bw/day</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
</tbody>
</table>
ERC4: Industrial use of processing aids in processes and products, not becoming part of articles
ERC7: Industrial use of substances in closed systems
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

For further information, please also consult our Internet site: Downstream Users
1. Short title of Exposure Scenario: Heat and pressure transfer fluids in dispersive, professional use but closed systems

Main User Groups: SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Environmental Release Categories: ERC9a, ERC9b: Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems

Process categories: PROC20: Heat and pressure transfer fluids in dispersive, professional use but closed systems

2.1 Contributing scenario controlling environmental exposure for: ERC9a, ERC9b: Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems

Amount used
Maximum daily site tonnage (kg/day): 12 kg/day
Fraction of EU tonnage used in region: 10%
Fraction of Regional tonnage used locally: 0.2%

Environment factors not influenced by risk management
Flow rate: 18,000 m3/day
Dilution Factor (River): 10

Other given operational conditions affecting environmental exposure
Number of emission days per year: 365
Emission or Release Factor: Air: 5%
Emission or Release Factor: Water: 5%
Emission or Release Factor: Soil: 5%

Conditions and measures related to municipal sewage treatment plant
Type of Sewage Treatment Plant: Municipal sewage treatment plant
Flow rate of sewage treatment plant effluent: 2,000 m3/day
Percentage removed from waste water: 90.4%

2.2 Contributing scenario controlling worker exposure for: PROC20: Heat and pressure transfer fluids in dispersive, professional use but closed systems
Activity: (closed systems)

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.
Physical Form (at time of use): liquid

Frequency and duration of use
Exposure duration: > 240 min
Remarks: Inhalation, Dermal
Frequency of use: <= 240 days/year

Human factors not influenced by risk management
Dermal exposure: Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor
Outdoor / Indoor: Outdoor

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection and gloves., Wear suitable protective clothing.

3. Exposure estimation and reference to its source

Environment

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartmen</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC9a</td>
<td>EUSES</td>
<td>Fresh water</td>
<td></td>
<td>0.003 mg/L</td>
<td>0.208</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td></td>
<td>1.595 mg/kg dry weight</td>
<td>0.208</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine water</td>
<td></td>
<td>0.0003 mg/L</td>
<td>0.166</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine sediment</td>
<td></td>
<td>0.159 mg/kg dry weight</td>
<td>0.207</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sewage treatment plant</td>
<td></td>
<td>0.029 mg/L</td>
<td>0.058</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil</td>
<td></td>
<td>0.256 mg/kg dry weight</td>
<td>0.059</td>
<td></td>
</tr>
</tbody>
</table>

Workers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC20</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>7.011 mg/m3</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long term dermal</td>
<td>0.342 mg/kg bw/day</td>
<td>0.095</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>------------------</td>
<td>--------------------</td>
<td>-------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ERC9a: Wide dispersive indoor use of substances in closed systems  
ERC9b: Wide dispersive outdoor use of substances in closed systems  
PROC20: Heat and pressure transfer fluids in dispersive, professional use but closed systems

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

For further information, please also consult our Internet site: Downstream Users  
1. Short title of Exposure Scenario: Monomer use in epoxy, PU, adhesives, coatings and other polymers, Industrial

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Environmental Release Categories: ERC6a, ERC6b, ERC6c, ERC6d: Industrial use resulting in manufacture of another substance (use of intermediates), Industrial use of reactive processing aids, Industrial use of monomers for manufacture of thermoplastics, Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers

Process categories: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC7: Industrial spraying
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC10: Roller application or brushing
PROC13: Treatment of articles by dipping and pouring
PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation
PROC19: Hand-mixing with intimate contact and only PPE available
PROC24: High (mechanical) energy work-up of substances bound in materials and/or articles

2.1 Contributing scenario controlling environmental exposure for: ERC5: Industrial use resulting in inclusion into or onto a matrix

Amount used
Maximum daily site tonnage (kg/day): 800 kg/day
Fraction of EU tonnage used in region: 100 %
Fraction of Regional tonnage used locally: 10 %

Environment factors not influenced by risk management
Flow rate: 18,000 m3/day
Dilution Factor (River): 10

Other given operational conditions affecting environmental exposure
Number of emission days per year: 220
Emission or Release Factor: Air: 1.7 %
Emission or Release Factor: Water: 0 %
ETHYLENEDIAMINE (EDA)

Emission or Release Factor: Soil : 0 %
Remarks : SpERC: FEICA 5.1b.v1

Technical conditions and measures / Organizational measures
Exposure time : Continuous use/release
Compartment : Fresh water, Fresh water sediment, Marine water, Marine sediment, Soil, Grassland, Sewage treatment plant

Conditions and measures related to municipal sewage treatment plant
Type of Sewage Treatment Plant : Municipal sewage treatment plant
Flow rate of sewage treatment plant effluent : 2,000 m3/day
Percentage removed from waste water : 100 %

2.2 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 5%.
Physical Form (at time of use) : liquid

Frequency and duration of use
Duration of the activity : > 4 h
Frequency of use : <= 240 days/year
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Dermal exposure : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Exposure routes
Inhalation exposure, Dermal exposure

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.3 Contributing scenario controlling worker exposure for: PROC7: Industrial spraying

<table>
<thead>
<tr>
<th>Activity</th>
<th>Spraying, Spraying (automatic/robotic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
</tbody>
</table>
| Concentration of the Substance in Mixture/Article | Covers percentage substance in the product up to 1 %.
| Physical Form (at time of use) | liquid |
| Frequency and duration of use |  |
| Duration of the activity | > 240 min |
| Remarks | Inhalation, Dermal |
| Frequency of use | <= 240 days/year |
| Remarks | Covers daily exposures up to 8 hours (unless stated differently). |

Human factors not influenced by risk management
Dermal exposure | Both hands plus forearms (1500 cm²).

Other operational conditions affecting workers exposure
Outdoor / Indoor | Indoor

Exposure routes
Inhalation exposure, Dermal exposure

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent/limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.4 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/dischargeing) from/to vessels/large containers at non-dedicated facilities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Drum/batch transfers, Bulk transfers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
</tbody>
</table>
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.
Physical Form (at time of use): liquid

Frequency and duration of use
Exposure duration: > 240 min
Remarks: Inhalation, Dermal
Frequency of use: <= 240 days/year

Human factors not influenced by risk management
Dermal exposure: Both hands (960 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

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

Activity: Roller, spreader, flow application

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.
Physical Form (at time of use): liquid

Frequency and duration of use
Exposure duration: > 240 min
Remarks: Inhalation, Dermal
Frequency of use: <= 240 days/year

Human factors not influenced by risk management
Dermal exposure: Both hands (960 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)
Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

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

<table>
<thead>
<tr>
<th>Activity</th>
<th>: Dipping, immersion and pouring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>: Covers the percentage of the substance in the product up to 5%.</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>: liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Exposure duration</td>
<td>: &gt; 240 min</td>
</tr>
<tr>
<td>Remarks</td>
<td>: Inhalation, Dermal</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>: &lt;= 240 days/year</td>
</tr>
<tr>
<td>Human factors not influenced by risk management</td>
<td></td>
</tr>
<tr>
<td>Dermal exposure</td>
<td>: Palms of both hands (480 cm2)</td>
</tr>
<tr>
<td>Other operational conditions affecting workers exposure</td>
<td></td>
</tr>
<tr>
<td>Outdoor / Indoor</td>
<td>: Indoor</td>
</tr>
<tr>
<td>Technical conditions and measures</td>
<td></td>
</tr>
<tr>
<td>Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)</td>
<td></td>
</tr>
</tbody>
</table>

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.7 Contributing scenario controlling worker exposure for: PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation

<table>
<thead>
<tr>
<th>Activity</th>
<th>: Production or preparation or articles by tabletting, compression, extrusion or pelletisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance</td>
<td>: Covers the percentage of the substance in the product up to 5%</td>
</tr>
</tbody>
</table>
in Mixture/Article to 5%.
Physical Form (at time of use): liquid

Frequency and duration of use
Duration of the activity: > 4 h
Frequency of use: ≤ 240 days/year
Remarks: Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Dermal exposure: Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Exposure routes
Inhalation exposure, Dermal exposure

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

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

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.
Physical Form (at time of use): liquid

Frequency and duration of use
Duration of the activity: 15 min - 1 h
Frequency of use: ≤ 240 days/year

Human factors not influenced by risk management
Dermal exposure: Both hands and main part of arms (1980 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Exposure routes
Inhalation exposure, Dermal exposure

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness (of a measure): 95 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin. Wear a respirator conforming to EN140 with Type A filter or better. (Effectiveness (of a measure): 90 %)

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

<table>
<thead>
<tr>
<th>Product characteristics</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers percentage substance in the product up to 1 %.</td>
<td></td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>Solid mixture, Dustiness: Medium</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency and duration of use</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of the activity</td>
<td>&gt; 4 h</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
<tr>
<td>Remarks</td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
</tbody>
</table>

Human factors not influenced by risk management
Dermal exposure | Palm of one hand (240 cm2) |

Other operational conditions affecting workers exposure
Outdoor / Indoor | Indoor |
Outdoor / Indoor | Outdoor |

Exposure routes
Inhalation exposure, Dermal exposure

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

3. Exposure estimation and reference to its source

Environment
## ETHYLENEDIAMINE (EDA)

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartments</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fresh water</td>
<td>0.0004 mg/L</td>
<td>0.027</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td>0.204 mg/kg dry weight</td>
<td>0.027</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marine water</td>
<td>&lt; 0.0001 mg/L</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marine sediment</td>
<td>0.02 mg/kg dry weight</td>
<td>0.026</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sewage treatment plant</td>
<td>0 mg/L</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Soil</td>
<td>0.002 mg/kg dry weight</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
</tbody>
</table>

### Workers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC5</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>2.504 mg/m³</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.137 mg/kg bw/day</td>
<td>0.038</td>
<td></td>
</tr>
<tr>
<td>PROC7</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>3.13 mg/m³</td>
<td>0.125</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.214 mg/kg bw/day</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>PROC8a</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>2.504 mg/m³</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.137 mg/kg bw/day</td>
<td>0.038</td>
<td></td>
</tr>
<tr>
<td>PROC10</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>2.504 mg/m³</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.274 mg/kg bw/day</td>
<td>0.076</td>
<td></td>
</tr>
<tr>
<td>PROC13</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>2.504 mg/m³</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.137 mg/kg bw/day</td>
<td>0.038</td>
<td></td>
</tr>
<tr>
<td>PROC14</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>2.504 mg/m³</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.137 mg/kg bw/day</td>
<td>0.038</td>
<td></td>
</tr>
<tr>
<td>PROC19</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>0.501 mg/m³</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term dermal</td>
<td>0.283 mg/kg bw/day</td>
<td>0.079</td>
<td></td>
</tr>
<tr>
<td>PROC24</td>
<td>ECETOC TRA v3.0</td>
<td>Indoor</td>
<td>Long term inhalation</td>
<td>1 mg/m³</td>
<td>0.04</td>
</tr>
<tr>
<td>Outdoor</td>
<td>Long term inhalation</td>
<td>0.75 mg/m³</td>
<td>0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>---------------------</td>
<td>-------------</td>
<td>------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long term dermal</td>
<td>0.288 mg/kg bw/day</td>
<td>0.08</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ERC5: Industrial use resulting in inclusion into or onto a matrix
PROC10: Roller application or brushing
PROC13: Treatment of articles by dipping and pouring
PROC14: Production of preparations or articles by tableting, compression, extrusion, pelletisation
PROC19: Hand-mixing with intimate contact and only PPE available
PROC24: High (mechanical) energy work-up of substances bound in materials and/or articles
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC7: Industrial spraying
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

For further information, please also consult our Internet site: Downstream Users
1. Short title of Exposure Scenario: Monomer use in epoxy, PU, adhesives, coatings and other polymers, Professional

Main User Groups: SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Environmental Release Categories: ERC8c, ERC8f: Wide dispersive indoor use resulting in inclusion into or onto a matrix, Wide dispersive outdoor use resulting in inclusion into or onto a matrix

Process categories: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC10: Roller application or brushing
PROC11: Non industrial spraying
PROC13: Treatment of articles by dipping and pouring
PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation
PROC19: Hand-mixing with intimate contact and only PPE available

2.1 Contributing scenario controlling environmental exposure for: ERC8c, ERC8f: Wide dispersive indoor use resulting in inclusion into or onto a matrix, Wide dispersive outdoor use resulting in inclusion into or onto a matrix

Amount used
Maximum daily site tonnage: 2 kg/day
Fraction of EU tonnage used in region: 10%
Fraction of Regional tonnage used locally: 0.2%

Environment factors not influenced by risk management
Flow rate: 18,000 m3/day
Dilution Factor (River): 10

Other given operational conditions affecting environmental exposure
Number of emission days per year: 365
Emission or Release Factor: Air: 0%
Emission or Release Factor: Water: 1.5%
Emission or Release Factor: Soil: 0%
Remarks: SpERC: FEICA 8c.1a.v1
Technical conditions and measures / Organizational measures

Exposure time: Continuous use/release
Compartment: Fresh water, Fresh water sediment, Marine water, Marine sediment, Soil, Grassland, Sewage treatment plant

Conditions and measures related to municipal sewage treatment plant
Type of Sewage Treatment Plant: Municipal sewage treatment plant
Flow rate of sewage treatment plant effluent: 2,000 m³/day
Effectiveness (of a measure): 90.4%

2.2 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

Activity: Indoor
Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.
Physical Form (at time of use): liquid

Frequency and duration of use
Duration of the activity: > 4 h
Frequency of use: <= 240 days/year
Remarks: Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Dermal exposure: Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor
Ventilation rate per hour: 3
Remarks: Use in large workrooms only.

Exposure routes
Inhalation exposure, Dermal exposure

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.
2.3 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Outdoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 5%.</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Duration of the activity</td>
<td>&gt; 4 h</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
<tr>
<td>Remarks</td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
</tbody>
</table>

Human factors not influenced by risk management
Dermal exposure: Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor: Outdoor

Exposure routes
Inhalation exposure, Dermal exposure

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.4 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Indoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 5%.</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Duration of the activity</td>
<td>&gt; 4 h</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
<tr>
<td>Remarks</td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
</tbody>
</table>
Human factors not influenced by risk management
Dermal exposure : Both hands (960 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Ventilation rate per hour : 3
Remarks : Use in large workrooms only.
Mass transfer rate : 10 - 100 L/min

Exposure routes
Inhalation exposure, Dermal exposure

Organisational measures to prevent / limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.5 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Outdoor</th>
</tr>
</thead>
</table>
| Product characteristics
Concentration of the Substance in Mixture/Article | Covers the percentage of the substance in the product up to 5%. |
Physical Form (at time of use) | liquid |

| Frequency and duration of use
Duration of the activity | > 4 h |
| Frequency of use | <= 240 days/year |
| Remarks | Covers daily exposures up to 8 hours (unless stated differently). |

Human factors not influenced by risk management
Dermal exposure : Both hands (960 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Outdoor

Exposure routes
Inhalation exposure, Dermal exposure

Organisational measures to prevent / limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
Use suitable eye protection. Wear suitable coveralls to prevent exposure to the skin.

<table>
<thead>
<tr>
<th>2.6 Contributing scenario controlling worker exposure for: PROC10: Roller application or brushing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity</strong></td>
</tr>
<tr>
<td><strong>Product characteristics</strong></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
</tr>
<tr>
<td><strong>Frequency and duration of use</strong></td>
</tr>
<tr>
<td>Duration of the activity</td>
</tr>
<tr>
<td>Remarks</td>
</tr>
<tr>
<td>Frequency of use</td>
</tr>
<tr>
<td>Remarks</td>
</tr>
<tr>
<td><strong>Human factors not influenced by risk management</strong></td>
</tr>
<tr>
<td>Dermal exposure</td>
</tr>
<tr>
<td><strong>Other operational conditions affecting workers exposure</strong></td>
</tr>
<tr>
<td>Outdoor / Indoor</td>
</tr>
<tr>
<td>Ventilation rate per hour</td>
</tr>
<tr>
<td>Remarks</td>
</tr>
<tr>
<td>Outdoor / Indoor</td>
</tr>
<tr>
<td>Spreading of liquids on surfaces or work pieces</td>
</tr>
<tr>
<td><strong>Exposure routes</strong></td>
</tr>
</tbody>
</table>

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 80 %)

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.
In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required, Wear a respirator conforming to EN140 with Type A filter or better. (Effectiveness (of a measure): 90 %)

2.7 Contributing scenario controlling worker exposure for: PROC11: Non industrial spraying

<table>
<thead>
<tr>
<th>Activity</th>
<th>Spraying, Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers percentage substance in the product up to 1 %</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>liquid</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Duration of the activity</td>
<td>&gt; 240 min</td>
</tr>
<tr>
<td>Remarks</td>
<td>Inhalation, Dermal</td>
</tr>
<tr>
<td>Frequency of use</td>
<td>&lt;= 240 days/year</td>
</tr>
<tr>
<td>Remarks</td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
</tbody>
</table>

Human factors not influenced by risk management
Dermal exposure: Both hands plus forearms (1500 cm2).

Other operational conditions affecting workers exposure
<table>
<thead>
<tr>
<th>Outdoor / Indoor</th>
<th>Indoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor / Indoor</td>
<td>Outdoor</td>
</tr>
</tbody>
</table>

Exposure routes
Inhalation exposure, Dermal exposure

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.
Wear a respirator conforming to EN140 with Type A filter or better. (Effectiveness (of a measure): 90 %)

2.8 Contributing scenario controlling worker exposure for: PROC13: Treatment of articles by dipping and pouring
Activity: Dipping, immersion and pouring

Product characteristics:
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.
- Physical Form (at time of use): liquid

Frequency and duration of use:
- Duration of the activity: > 240 min
- Remarks: Inhalation, Dermal
- Frequency of use: <= 240 days/year
- Remarks: Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management:
- Dermal exposure: Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure:
- Outdoor / Indoor: Indoor

Technical conditions and measures:
- Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 80 %)

Organisational measures to prevent /limit releases, dispersion and exposure:
- Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation:
- Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
- Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.9 Contributing scenario controlling worker exposure for: PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation

Product characteristics:
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.
- Physical Form (at time of use): liquid

Frequency and duration of use:
- Duration of the activity: > 4 h
- Frequency of use: <= 240 days/year
- Remarks: Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management:
- Dermal exposure: Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure:
- Outdoor / Indoor: Indoor
Exposure routes
Inhalation exposure, Dermal exposure

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 80 %)

Organisational measures to prevent/limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

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

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.
Physical Form (at time of use): liquid

Frequency and duration of use
Duration of the activity: < 1 h
Frequency of use: <= 240 days/year
Exposure duration: < 1 h

Human factors not influenced by risk management
Dermal exposure: Both hands and main part of arms (1980 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Exposure routes
Inhalation exposure, Dermal exposure

Organisational measures to prevent/limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.
Wear a respirator conforming to EN140 with Type A filter or better. (Effectiveness (of a measure): 90 %)

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

Product characteristics
Concentration of the Substance in Mixture/Article : Covers percentage substance in the product up to 1 %.
Physical Form (at time of use) : Solid, medium dustiness

Frequency and duration of use
Duration of the activity : > 4 h
Frequency of use : <= 240 days/year
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Dermal exposure : Palm of one hand (240 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Outdoor / Indoor : Outdoor

Exposure routes
Inhalation exposure, Dermal exposure

Organisational measures to prevent/limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Environment</th>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartmen nt</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC8c</td>
<td>EUSES</td>
<td>Fresh water</td>
<td>0.0006 mg/L</td>
<td>0.035</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td>0.272 mg/kg dry weight</td>
<td>0.035</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine water</td>
<td>&lt; 0.0001 mg/L</td>
<td>0.028</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine sediment</td>
<td>0.026 mg/kg dry weight</td>
<td>0.034</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sewage treatment plant</td>
<td>0.002 mg/L</td>
<td>&lt; 0.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**ETHYLENEDIAMINE (EDA)**

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC5</td>
<td>ART</td>
<td>Indoor</td>
<td>1.9 mg/m³</td>
<td>0.076</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>0.548 mg/kg bw/day</td>
<td>0.152</td>
<td></td>
</tr>
<tr>
<td>PROC5</td>
<td>ART</td>
<td>Outdoor</td>
<td>0.69 mg/m³</td>
<td>0.028</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>0.548 mg/kg bw/day</td>
<td>0.152</td>
<td></td>
</tr>
<tr>
<td>PROC8a</td>
<td>ART</td>
<td>Indoor</td>
<td>5.8 mg/m³</td>
<td>0.232</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>0.548 mg/kg bw/day</td>
<td>0.152</td>
<td></td>
</tr>
<tr>
<td>PROC8a</td>
<td>ART</td>
<td>Outdoor</td>
<td>2.1 mg/m³</td>
<td>0.084</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>0.548 mg/kg bw/day</td>
<td>0.152</td>
<td></td>
</tr>
<tr>
<td>PROC10</td>
<td>ART</td>
<td>Indoor</td>
<td>0.58 mg/m³</td>
<td>0.023</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ART</td>
<td>Outdoor</td>
<td>1.764 mg/m³</td>
<td>0.071</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>0.549 mg/kg bw/day</td>
<td>0.152</td>
<td></td>
</tr>
<tr>
<td>PROC11</td>
<td>ART</td>
<td>Indoor</td>
<td>3.8 mg/m³</td>
<td>0.152</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ART</td>
<td>Outdoor</td>
<td>1.4 mg/m³</td>
<td>0.056</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>2.143 mg/kg bw/day</td>
<td>0.595</td>
<td></td>
</tr>
<tr>
<td>PROC13</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>10.02 mg/m³</td>
<td>0.401</td>
<td></td>
</tr>
<tr>
<td>PROC14</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>0.548 mg/kg bw/day</td>
<td>0.152</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term inhalation</td>
<td>10.02 mg/m³</td>
<td>0.401</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term inhalation</td>
<td>0.137 mg/kg bw/day</td>
<td>0.038</td>
<td></td>
</tr>
<tr>
<td>PROC19</td>
<td>ECETOC TRA v3.0</td>
<td>Long term inhalation</td>
<td>1.002 mg/m³</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term inhalation</td>
<td>1.131 mg/kg bw/day</td>
<td>0.314</td>
<td></td>
</tr>
<tr>
<td>PROC24</td>
<td>ECETOC TRA v3.0</td>
<td>Indoor</td>
<td>2 mg/m³</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outdoor</td>
<td>1.5 mg/m³</td>
<td>0.06</td>
<td></td>
</tr>
</tbody>
</table>
ETHYLENEDIAMINE (EDA)

| Long term dermal | 0.288 mg/kg bw/day | 0.08 |

ERC8c: Wide dispersive indoor use resulting in inclusion into or onto a matrix
ERC8f: Wide dispersive outdoor use resulting in inclusion into or onto a matrix
PROC10: Roller application or brushing
PROC11: Non industrial spraying
PROC13: Treatment of articles by dipping and pouring
PROC14: Production of preparations or articles by tableting, compression, extrusion, pelletisation
PROC19: Hand-mixing with intimate contact and only PPE available
PROC24: High (mechanical) energy work-up of substances bound in materials and/or articles
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

For further information, please also consult our Internet site: Downstream Users