SAFETY DATA SHEET

Triethylenetetramine, TETA

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

1.1 Product identifier

Product name : Triethylenetetramine, TETA

Index number : 612-065-00-8

EC number : 292-588-2

REACH Registration number

Registration number	Legal entity
01-2119487919-13-0000	-

CAS number : European Union: 90640-67-8
112-24-3

Other means of identification : -

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

Product use : Intermediate. Chemical synthesis.

Identified uses
ES 01: Manufacture - Industrial: PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15; ERC01 **ES 02:** Formulation: Ashless dispersant - Industrial: PC20; PROC01, PROC02, PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02 **ES 03:** Formulation: Diesel and gasoline additive - Industrial: PC13; PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02 **ES 04** Formulation: Wood preservatives - Industrial: PC08; PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02 **ES 05** Formulation: Epoxy curing agent - Industrial: PC01; PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02 **ES 06** Formulation: Epoxy curing agent in paint - Industrial: PC09a; PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02 **ES 07:** Formulation: Coatings, Adhesives and inks - Industrial: PC01, PC09a, PC18; PROC01, PROC02, PROC03, PROC04, PROC05, PROC08b, PROC09; ERC02 **ES 08:** Use at industrial sites: Ashless dispersant - Industrial: PC20; PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15; ERC06a **ES 09:** Use at industrial sites: Diesel and gasoline additive - Industrial: PC13; PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15; ERC06a **ES 10:** Use at industrial sites: Wood preservatives - Industrial: PC08; PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15; ERC06a **ES 11:** Use at industrial sites: Epoxy curing agent - Industrial: PC01; PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15; ERC06a **ES 12:** Use at industrial sites: Epoxy curing agent in paint - Industrial: PC09a; PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15; ERC06a **ES 13:** Use at industrial sites: Processing aid - Industrial: PROC01, PROC02, PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC12, PROC13, PROC14, PROC15; ERC04 **ES 14:** Use at industrial sites: Coatings, Adhesives and inks - Industrial: PC01, PC09a, PC18; PROC02, PROC05, PROC07, PROC08b, PROC09, PROC10, PROC13; ERC04 **ES 15:** Use at industrial sites: Use as laboratory reagent - Industrial: PC21; PROC15; ERC04

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

1.3 Details of the supplier of the safety data sheet

Delamine B.V.
Stationsplein 121
3818LE Amersfoort
The Netherlands
Telephone number: +31-334224600

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

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

1.4 Emergency telephone number

Supplier

Telephone number : +1 352 323 3500 (24 h)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Product definition : Multi-constituent substance

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

Acute Tox. 4, H302
Acute Tox. 4, H312
Skin Corr. 1B, H314
Eye Dam. 1, H318
Skin Sens. 1, H317
Aquatic Chronic 3, H412

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

See Section 16 for the full text of the H statements declared above.

See Section 11 for more detailed information on health effects and symptoms.

2.2 Label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H302 + H312 - Harmful if swallowed or in contact with skin.
H314 - Causes severe skin burns and eye damage.
H317 - May cause an allergic skin reaction.
H412 - Harmful to aquatic life with long lasting effects.

Precautionary statements

Prevention : P280 - Wear protective gloves. Wear eye or face protection. Wear protective clothing.
P260 - Do not breathe vapour.
P273 - Avoid release to the environment.

Response : P303 + P361 + P353 + P310 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Immediately call a POISON CENTER or physician.
P333 + P313 - If skin irritation or rash occurs: Get medical attention.
P305 + P351 + P338 + P310 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.

Storage : Not applicable.

Disposal : Not applicable.

Hazardous ingredients : Amines, polyethylenepoly-, triethylenetetramine fraction
2-(2-aminoethylamino)ethanol

Supplemental label elements : EUH071 - Corrosive to the respiratory tract.

SECTION 2: Hazards identification

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

2.3 Other hazards

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

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

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

SECTION 3: Composition/information on ingredients

3.1 Substances

: Multi-constituent substance

Product/ingredient name	Identifiers	%	Regulation (EC) No. 1272/2008 [CLP]	Type
Amines, polyethylenepoly-, triethylenetetramine fraction	REACH #: 01-2119487919-13 EC: 292-588-2 CAS: 90640-67-8 (Other means of identification CAS no. 112-24-3) Index: 612-059-00-5	>99	Acute Tox. 4, H302 Acute Tox. 4, H312 Skin Corr. 1B, H314 Eye Dam. 1, H318 Skin Sens. 1, H317 Aquatic Chronic 3, H412 EUH071	[A]
2-(2-aminoethylamino) ethanol	REACH #: 01-2119456894-24 EC: 203-867-5 CAS: 111-41-1 Index: 603-194-00-0	<0.3	Skin Corr. 1B, H314 Eye Dam. 1, H318 Skin Sens. 1B, H317 Repr. 1B, H360FD (Fertility and Unborn child) Lact., H362 **See Section 16 for the full text of the H statements declared above.**	[B]

There are no additional ingredients present which, within the current knowledge of the supplier, are classified and contribute to the classification of the substance and hence require reporting in this section.

Type

[A] Constituent
[B] Impurity
[C] Stabilising additive

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

SECTION 4: First aid measures

4.1 Description of first aid measures

Eye contact : Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

Inhalation : Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately.

SECTION 4: First aid measures

Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Get medical attention immediately. Call a poison center or physician. Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

4.2 Most important symptoms and effects, both acute and delayed

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : Corrosive to the respiratory tract. Causes burns.

Skin contact : Causes severe burns. Harmful in contact with skin. May cause an allergic skin reaction.

Ingestion : Harmful if swallowed.

Over-exposure signs/symptoms

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

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

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

Ingestion : Adverse symptoms may include the following:
stomach pains

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam. Dry sand or other suitable absorbent. Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : Do not use water jet.

5.2 Special hazards arising from the substance or mixture

Hazards from the substance or mixture : In a fire or if heated, a pressure increase will occur and the container may burst. This material is harmful to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous combustion products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides

5.3 Advice for firefighters

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

Additional information (Explosibility) : Not considered to be a product presenting a risk of explosion.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Do not breathe vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials.
See also the information in "For non-emergency personnel".

6.2 Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

6.3 Methods and material for containment and cleaning up

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

Large spill : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product.

SECTION 6: Accidental release measures

6.4 Reference to other sections : See Section 1 for emergency contact information.
See Section 8 for information on appropriate personal protective equipment.
See Section 13 for additional waste treatment information.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not breathe vapour or mist. Do not ingest. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Keep away from acids. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

7.2 Conditions for safe storage, including any incompatibilities

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

7.3 Specific end use(s)

Section 7. Handling and storage: The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

SECTION 8: Exposure controls/personal protection

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

8.1 Control parameters

Occupational exposure limits

No exposure limit value known.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to monitoring standards, such as the following: European Standard EN 689 (Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy) European Standard EN 14042 (Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents) European Standard EN 482 (Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents) Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

DNELs/DMELs

SECTION 8: Exposure controls/personal protection

Product/ingredient name	Type	Exposure	Value	Population	Effects
Amines, polyethylenepoly-, triethylenetetramine fraction	DNEL	Long term Inhalation	0.54 mg/m³	Workers	Systemic
	DNEL	Long term Inhalation	0.096 mg/m³	General population	Systemic
	DNEL	Long term Oral	0.14 mg/kg bw/day	General population	Systemic

PNECs

Product/ingredient name	Compartment Detail	Value	Method Detail
Amines, polyethylenepoly-, triethylenetetramine fraction	Fresh water	0.027 mg/l	Assessment Factors
	Marine water	0.003 mg/l	Assessment Factors
	Fresh water sediment	8.572 mg/kg dwt	Equilibrium Partitioning
	Marine water sediment	0.857 mg/kg dwt	Equilibrium Partitioning
	Sewage Treatment Plant	0.13 mg/l	Assessment Factors
	Soil	1.25 mg/kg dwt	Assessment Factors

8.2 Exposure controls

Appropriate engineering controls : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Recommended: Wear suitable gloves tested to EN374.
> 8 hours (breakthrough time): butyl rubber (thickness ≥0.3 mm), nitrile rubber (thickness ≥0.4 mm), Chloroprene (thickness ≥0.65 mm).

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

SECTION 8: Exposure controls/personal protection

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Recommended: Combination filtering device (DIN EN 14387), Filter type: A-P2.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state	:	Liquid.
Colour	:	Off-white. Clear.
Odour	:	Faint odour.
Odour threshold	:	Not available.
pH	:	13.2
Melting point/freezing point	:	-71°C
Initial boiling point and boiling range	:	274.6°C
Flash point	:	Closed cup: 118°C
Evaporation rate	:	Not available.
Flammability (solid, gas)	:	Not applicable.
Upper/lower flammability or explosive limits	:	Not available.
Vapour pressure	:	0.00035 kPa [room temperature]
Vapour density	:	Not available.
Relative density	:	Not available.
Density	:	0.971 g/cm³
Solubility(ies)	:	Not available.
Solubility in water	:	>1000 g/l
Partition coefficient: n-octanol/water	:	-2.65
Auto-ignition temperature	:	325°C
Decomposition temperature	:	Not available.
Viscosity	:	Kinematic (room temperature): 0.286 cm^2/s
Explosive properties	:	Not considered to be a product presenting a risk of explosion.
Oxidising properties	:	None.

9.2 Other information

No additional information.

SECTION 10: Stability and reactivity

10.1 Reactivity : No specific test data related to reactivity available for this product or its ingredients.

10.2 Chemical stability : The product is stable.

10.3 Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur. Under normal conditions of storage and use, hazardous polymerisation will not occur.

10.4 Conditions to avoid : aerosol or mist formation. Keep away from heat, sparks and flame. Do not smoke.

10.5 Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials, metals, acids. Chlorinated hydrocarbon.

10.6 Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure	Remarks
Amines, polyethylenepoly-, triethylenetetramine fraction	LD50 Dermal [OECD 402]	Rabbit - Male, Female	1465.4 mg/kg	-	-
	LD50 Oral [OECD 401]	Rat - Male, Female	1716.2 mg/kg	-	-
2-(2-aminoethylamino) ethanol	LD50 Dermal [OECD 402]	Rat - Male, Female	>2000 mg/kg	-	-
	LD50 Oral [OECD 401]	Rat - Male, Female	2150 mg/kg	-	-

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

Acute toxicity estimates

Product/ingredient name	Oral (mg/kg)	Dermal (mg/kg)	Inhalation (gases) (ppm)	Inhalation (vapours) (mg/l)	Inhalation (dusts and mists) (mg/l)
Amines, polyethylenepoly-, triethylenetetramine fraction	1716.2	1465.4	N/A	N/A	N/A
2-(2-aminoethylamino)ethanol	2150	N/A	N/A	N/A	N/A

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation	Remarks
Amines, polyethylenepoly-, triethylenetetramine fraction	Skin - Visible necrosis [OECD 404]	Rabbit	-	4 hours	14 days	-
	Eyes - Severe irritant [OECD 405]	Rabbit	-	1 hours	-	-
2-(2-aminoethylamino)	Skin - Visible	Rabbit	-	4 hours	14 days	-

SECTION 11: Toxicological information

ethanol	necrosis [OECD 404] Eyes - Oedema of the conjunctivae [OECD 405]	Rabbit	3	24 hours	8 days	-

Conclusion/Summary

Skin : Causes severe burns.

Eyes : Causes serious eye damage.

Sensitisation

Product/ingredient name	Route of exposure	Species	Result	Remarks
Amines, polyethylenepoly-, triethylenetetramine fraction	skin	Guinea pig	Sensitising [OECD 406]	-
2-(2-aminoethylamino) ethanol	skin	Mouse	Sensitising [OECD 429]	-

Conclusion/Summary

Skin : May cause an allergic skin reaction.

Mutagenicity

Product/ingredient name	Test	Experiment	Result	Remarks
Amines, polyethylenepoly-, triethylenetetramine fraction	OECD 471	Experiment: In vitro Subject: Bacteria	Negative	-
	OECD 476	Experiment: In vitro Subject: Mammalian-Animal	Negative	-
	OECD 477	Experiment: In vivo Subject: Insect	Negative	-
	OECD 474	Experiment: In vivo Subject: Mammalian-Animal	Negative	-
2-(2-aminoethylamino) ethanol	OECD 477	Experiment: In vivo Subject: Insect Cell: Germ	Negative	-

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

Carcinogenicity

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

Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility	Developmental toxin	Species	Dose	Exposure	Remarks
2-(2-aminoethylamino) ethanol	Negative	Positive	Positive	Rat - Male, Female	Oral	-	OECD 421

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

Teratogenicity

SECTION 11: Toxicological information

Product/ingredient name	Result	Species	Dose	Exposure	Remarks
Amines, polyethylenepoly-, triethylenetetramine fraction	Negative - Oral [OECD 414]	Rat	≥750 mg/kg NOAEL (Maternal toxicity: None.)	-	-
	Negative - Dermal [OECD 414]	Rabbit	≥125 mg/kg NOAEL (Developmental Toxicity: None.)	-	-

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

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : Corrosive to the respiratory tract. Causes burns.

Skin contact : Causes severe burns. Harmful in contact with skin. May cause an allergic skin reaction.

Ingestion : Harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

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

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

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

Ingestion : Adverse symptoms may include the following:
stomach pains

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

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

SECTION 11: Toxicological information

Potential delayed effects : Not available.

Potential chronic health effects

Product/ingredient name	Result	Species	Dose	Exposure	Remarks
Amines, polyethylenepoly-, triethylenetetramine fraction	Sub-chronic NOAEL Oral [OECD 408]	Rat - Female	50 mg/kg	-	test substance: CAS no.38260-01-4 (read-across).
2-(2-aminoethylamino) ethanol	Sub-acute NOEL Oral [OECD 407]	Rat - Male, Female	60 mg/kg	28 days	-
	Sub-acute NOAEL Dermal [OECD 410]	Rat - Male, Female	1000 mg/kg	4 weeks; 5 days per week	-

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

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

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Other information : Not available.

SECTION 12: Ecological information

12.1 Toxicity

Product/ingredient name	Result	Species	Exposure	Remarks
Amines, polyethylenepoly-, triethylenetetramine fraction	Acute EC50 20 mg/l Fresh water [OECD 201]	Algae - Pseudokirchneriella subcapitata	72 hours	-
	Acute EC50 31.1 mg/l Fresh water [EU C.2]	Daphnia - Daphnia magna	48 hours	-
	Acute LC50 330 mg/l Fresh water [EU C.1]	Fish - Pimephales promelas	96 hours	-
	Chronic EC10 1.9 mg/l Fresh water [OECD 202]	Daphnia - Daphnia magna	21 days	-
	Chronic NOEC 1.34 mg/l Fresh water [OECD 201]	Algae - Pseudokirchneriella subcapitata	72 hours	-
2-(2-aminoethylamino) ethanol	Acute EC50 920 mg/l Marine water [ISO 10253]	Algae	72 hours	-
	Acute EC50 190 mg/l Fresh water [OECD 202]	Daphnia	48 hours	-
	Acute LC50 640 mg/l Fresh water	Fish	96 hours	-

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

12.2 Persistence and degradability

SECTION 12: Ecological information

Product/ingredient name	Test	Result	Dose	Inoculum
Amines, polyethylenepoly-, triethylenetetramine fraction	OECD 301D	0 % - Not readily - 162 days	-	-
2-(2-aminoethylamino) ethanol	OECD 301F	>60 % - Readily - 28 days	-	-

Conclusion/Summary : Not readily biodegradable.

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Amines, polyethylenepoly-, triethylenetetramine fraction	-	-	Not readily
2-(2-aminoethylamino) ethanol	-	-	Readily

12.3 Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Amines, polyethylenepoly-, triethylenetetramine fraction	-2.65	-	low
2-(2-aminoethylamino) ethanol	-1.46	2.1	low

12.4 Mobility in soil

Soil/water partition coefficient (K_{OC}) : 4000

Mobility : Low mobility in soil predicted, based on the log Koc value.

12.5 Results of PBT and vPvB assessment

Product/ingredient name	PBT	P	B	T	vPvB	vP	vB
Amines, polyethylenepoly-, triethylenetetramine fraction	No	Yes	No	No	No	No	No

12.6 Other adverse effects : No known significant effects or critical hazards.

SECTION 13: Disposal considerations

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

13.1 Waste treatment methods

Product

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction.

The allocation of waste identity numbers/waste descriptions must be carried out according to the EWC, specific to the industry and process.

Hazardous waste : The classification of the product may meet the criteria for a hazardous waste.

Packaging

Methods of disposal : The generation of waste should be avoided or minimised wherever possible.

SECTION 13: Disposal considerations

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

SECTION 14: Transport information

	ADR/RID	ADN	IMDG	IATA
14.1 UN number	UN2259	UN2259	UN2259	UN2259
14.2 UN proper shipping name	TRIETHYLENETETRAMINE	TRIETHYLENETETRAMINE	TRIETHYLENETETRAMINE	Triethylenetetramine
14.3 Transport hazard class(es)	8	8	8	8
Label				
14.4 Packing group	II	II	II	II
14.5 Environmental hazards	No.	Yes.	Marine Pollutant: No	No.

Additional information

ADR/RID : **Hazard identification number** 80
Limited quantity 1 L
Tunnel code (E)

ADN : The product is only regulated as an environmentally hazardous substance when transported in tank vessels.

IMDG : **Emergency schedules** F-A, S-B

IATA : **Quantity limitation** Passenger and Cargo Aircraft: 1 L. Packaging instructions: 851. Cargo Aircraft Only: 30 L. Packaging instructions: 855. Limited Quantities - Passenger Aircraft: 0.5 L. Packaging instructions: Y840.

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

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

Proper shipping name : Triethylenetetramine
Ship type : 2
Pollution category : Y

SECTION 15: Regulatory information

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

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XIV - List of substances subject to authorisation

Annex XIV

None of the components are listed.

Substances of very high concern

None of the components are listed.

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

SECTION 15: Regulatory information

Other EU regulations

Ozone depleting substances (1005/2009/EU)

Not listed.

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

Not listed.

Seveso Directive

This product is not controlled under the Seveso Directive.

National regulations

Hazchem code : 2X

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

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

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

Australia inventory (AICS) : All components are listed or exempted.

Canada : All components are listed or exempted.

China : All components are listed or exempted.

Europe : All components are listed or exempted.

Japan : **Japan inventory (ENCS):**
All components are listed or exempted.

New Zealand : All components are listed or exempted.

Philippines : All components are listed or exempted.

Republic of Korea : All components are listed or exempted.

Taiwan : All components are listed or exempted.

Turkey : All components are listed or exempted.

United States : All components are listed or exempted.

15.2 Chemical safety assessment : Complete.

SECTION 16: Other information

Indicates information that has changed from previously issued version.

Abbreviations and acronyms : ADN = European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway
ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
EUH statement = CLP-specific Hazard statement

SECTION 16: Other information

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

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

Classification	Justification
Acute Tox. 4, H302	Calculation method
Acute Tox. 4, H312	Calculation method
Skin Corr. 1B, H314	Expert judgment
Eye Dam. 1, H318	On basis of test data
Skin Sens. 1, H317	Calculation method
Aquatic Chronic 3, H412	Calculation method

Full text of abbreviated H statements

H302	Harmful if swallowed.
H312	Harmful in contact with skin.
H314	Causes severe skin burns and eye damage.
H317	May cause an allergic skin reaction.
H318	Causes serious eye damage.
H360FD	May damage fertility. May damage the unborn child.
H362	May cause harm to breast-fed children.
H412	Harmful to aquatic life with long lasting effects.

Full text of classifications [CLP/GHS]

Acute Tox. 4, H302	ACUTE TOXICITY (oral) - Category 4
Acute Tox. 4, H312	ACUTE TOXICITY (dermal) - Category 4
Aquatic Chronic 3, H412	LONG-TERM (CHRONIC) AQUATIC HAZARD - Category 3
EUH071	Corrosive to the respiratory tract.
Eye Dam. 1, H318	SERIOUS EYE DAMAGE/EYE IRRITATION - Category 1
Lact., H362	REPRODUCTIVE TOXICITY - Effects on or via lactation
Repr. 1B, H360FD	REPRODUCTIVE TOXICITY (Fertility and Unborn child) - Category 1B
Skin Corr. 1B, H314	SKIN CORROSION/IRRITATION - Category 1B
Skin Sens. 1, H317	SKIN SENSITISATION - Category 1
Skin Sens. 1B, H317	SKIN SENSITISATION - Category 1B

Date of printing : 18/07/2019

Date of issue/ Date of revision : 18/07/2019

Date of previous issue : 05/10/2017

Version : 13

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition	:	Multi-constituent substance
Product name	:	Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario	:	Manufacture.
List of use descriptors	:	**Identified use name: ES 01:** Manufacture - Industrial: PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15; ERC01 **Process Category:** PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC01
Environmental contributing scenarios	:	**Manufacture of the substance -** ERC01
Health Contributing scenarios	:	**Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions -** PROC01 **Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions -** PROC02 **Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition -** PROC03 **Chemical production where opportunity for exposure arises -** PROC04 **Transfer of substance or mixture (charging and discharging) at non-dedicated facilities -** PROC08a **Transfer of substance or mixture (charging and discharging) at dedicated facilities -** PROC08b **Use as laboratory reagent -** PROC15
Number of the ES	:	01

Section 2 - Exposure controls

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

Product characteristics	:	Liquid.
Amounts used	:	Annual site tonnage: 15.5 tonnes/year. Daily amount per site: 4650 tonnes/day.
Frequency and duration of use	:	Emission days: ≥300 days per year.
Other conditions affecting environmental exposure	:	Receiving surface water flow ≥18000 m³/d. Release factor after on-site risk management: water: 0.0000403 % (Estimated release factor). Local release rate: 0.00625 kg/day. air: 0.0011 % (Estimated release factor). Local release rate: 0.171 kg/day. Soil: 0 % (Estimated release factor).
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil	:	Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.
Organisational measures to prevent/limit release from site	:	Prevent discharge of undissolved substance to or recover from onsite wastewater.

Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %) Assumed domestic sewage treatment plant flow 2000 m³/d. Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal	:	Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics	:	Liquid.
Concentration of substance in mixture or article	:	Covers concentrations up to 100 %.
Other conditions affecting workers exposure	:	Indoor use. Temperature: ≤40°C.
Technical conditions and measures to control dispersion from source towards the worker	:	Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced.
Organisational measures to prevent/limit releases, dispersion and exposure	:	- Any measure to eliminate exposure should be considered. - Very high level of containment required, except for short term exposures e.g. taking samples. - Design closed system to allow for easy maintenance. - If possible keep equipment under negative pressure. - Control staff entry to work area. - Ensure all equipment well maintained. - Permit to work for maintenance work. - Regular cleaning of equipment and work area. - Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed. - Training for staff on good practice. - Procedures and training for emergency decontamination and disposal. - Good standard of personal hygiene. - Recording of any 'near miss' situations. - Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection	:	- All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment) - Substance/Task appropriate gloves. - Skin coverage with appropriate barrier material based on potential for contact with the chemicals. - Substance/task appropriate respiratory protection. - Optional face shield. - Eye protection.

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

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

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

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

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

Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

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

Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

Contributing scenario controlling worker exposure for 5: Chemical production where opportunity for exposure arises

Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

Contributing scenario controlling worker exposure for 6: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

Contributing scenario controlling worker exposure for 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

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

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

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

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

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

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

Section 3 - Exposure estimation and reference to its source

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

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.000242 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Freshwater sediment: 0.077 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water: 0.0000242 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water sediment: 0.00773 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Sewage Treatment Plant: 0.00226 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.017.

Soil: 0.038 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.03.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.072 mg/m³.
Risk characterisation ratio: 0.133.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

Exposure estimation and reference to its source - Workers: 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.129 mg/m³. Risk characterisation ratio: 0.239.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 5: Chemical production where opportunity for exposure arises

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.43 mg/m³. Risk characterisation ratio: 0.796.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.108 mg/m³. Risk characterisation ratio: 0.199.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 8: Use as laboratory reagent

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Multi-constituent substance

Product name : Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario : Formulation: Ashless dispersant; Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents (PC20).

List of use descriptors : **Identified use name: ES 02:** Formulation: Ashless dispersant - Industrial: PC20; PROC01, PROC02, PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02
Process Category: PROC01, PROC02, PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC15
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC02
Market sector by type of chemical product: PC20

Environmental contributing scenarios : **Formulation into mixture -** ERC02

Health Contributing scenarios : **Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions -** PROC01
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC02
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition - PROC03
Chemical production where opportunity for exposure arises - PROC04
Mixing or blending in batch processes - PROC05
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - PROC08a
Transfer of substance or mixture (charging and discharging) at dedicated facilities - PROC08b
Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC09
Use as laboratory reagent - PROC15

Number of the ES : 02

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Formulation into mixture

Product characteristics : Liquid.

Amounts used : Annual site tonnage: 1160 tonnes/year.
Daily amount per site: 3.867 tonnes/day.

Frequency and duration of use : Emission days: ≥300 days per year.

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:
water: 0 % (Estimated release factor).
Local release rate: 0 kg/day.
air: 0.0011 % (Estimated release factor).
Local release rate: 0.043 kg/day.
Soil: 0 % (Estimated release factor).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil	:	Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.
Organisational measures to prevent/limit release from site	:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %) Assumed domestic sewage treatment plant flow 2000 m³/d. Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal	:	Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics	:	Liquid.
Other conditions affecting workers exposure	:	Indoor use. Temperature: ≤40°C.
Technical conditions and measures to control dispersion from source towards the worker	:	Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced.
Organisational measures to prevent/limit releases, dispersion and exposure	:	- Any measure to eliminate exposure should be considered. - Very high level of containment required, except for short term exposures e.g. taking samples. - Design closed system to allow for easy maintenance. - If possible keep equipment under negative pressure. - Control staff entry to work area. - Ensure all equipment well maintained. - Permit to work for maintenance work. - Regular cleaning of equipment and work area. - Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed. - Training for staff on good practice. - Procedures and training for emergency decontamination and disposal. - Good standard of personal hygiene. - Recording of any 'near miss' situations. - Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection	:	- All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment) - Substance/Task appropriate gloves. - Skin coverage with appropriate barrier material based on potential for contact with the chemicals. - Substance/task appropriate respiratory protection. - Optional face shield. - Eye protection.

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

Product characteristics	:	Covers concentrations up to 100 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤8 hours.

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

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

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

Product characteristics	:	Covers concentrations up to 100 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

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

Product characteristics	:	Covers concentrations up to 100 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

Contributing scenario controlling worker exposure for 5: Chemical production where opportunity for exposure arises

Product characteristics	:	Covers concentrations up to 100 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

Contributing scenario controlling worker exposure for 6: Mixing or blending in batch processes

Product characteristics	:	Covers concentrations up to 100 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

Contributing scenario controlling worker exposure for 7: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product characteristics	:	Covers concentrations up to 100 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

Contributing scenario controlling worker exposure for 8: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	:	Covers concentrations up to 100 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

Contributing scenario controlling worker exposure for 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Product characteristics	:	Covers concentrations up to 100 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

Contributing scenario controlling worker exposure for 10: Use as laboratory reagent

Product characteristics	:	Covers concentrations up to 5 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Formulation into mixture

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.0000175 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Freshwater sediment: 0.00558 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water: 0.00000171 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water sediment: 0.000547 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Sewage Treatment Plant: 0 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Soil: 0.00227 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.072 mg/m³.
Risk characterisation ratio: 0.133.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

Exposure estimation and reference to its source - Workers: 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.129 mg/m³.
Risk characterisation ratio: 0.239.

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

Exposure estimation and reference to its source - Workers: 5: Chemical production where opportunity for exposure arises

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.215 mg/m³.
Risk characterisation ratio: 0.398.

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

Exposure estimation and reference to its source - Workers: 6: Mixing or blending in batch processes

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.215 mg/m³.
Risk characterisation ratio: 0.398.

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

Exposure estimation and reference to its source - Workers: 7: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

Exposure estimation and reference to its source - Workers: 8: Transfer of substance or mixture (charging and discharging) at dedicated facilities

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.108 mg/m³.
Risk characterisation ratio: 0.199.

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

Exposure estimation and reference to its source - Workers: 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.215 mg/m³.
Risk characterisation ratio: 0.398.

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

Exposure estimation and reference to its source - Workers: 10: Use as laboratory reagent

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.43 mg/m³. Risk characterisation ratio: 0.796.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Multi-constituent substance

Product name : Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario : Formulation: Diesel and gasoline additive; Fuels (PC13).

List of use descriptors : **Identified use name: ES 03:** Formulation: Diesel and gasoline additive - Industrial: PC13; PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02
Process Category: PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC02
Market sector by type of chemical product: PC13

Environmental contributing scenarios : **Formulation into mixture -** ERC02

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

Number of the ES : 03

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Formulation into mixture

Product characteristics : Liquid.

Amounts used : Annual site tonnage: 0.58 tonnes/year.
Daily amount per site: 0.00159 tonnes/day.

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

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:
water: 0 % (Estimated release factor).
Local release rate: 0 kg/day.
air: 0.001 % (Estimated release factor).
Local release rate: 0.0000159 kg/day.
Soil: 0 % (Estimated release factor).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.

Organisational measures to prevent/limit release from site : Prevent discharge of undissolved substance to or recover from onsite wastewater.

Conditions and measures related to sewage treatment plant : Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %)
Assumed domestic sewage treatment plant flow 2000 m³/d.
Application of the STP sludge on agricultural soil: Yes.

Conditions and measures related to external treatment of waste for disposal	:	Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics	:	Liquid.
Concentration of substance in mixture or article	:	Covers concentrations up to 100 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Other conditions affecting workers exposure	:	Indoor use. Temperature: ≤40°C.
Technical conditions and measures to control dispersion from source towards the worker	:	Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced.
Organisational measures to prevent/limit releases, dispersion and exposure	:	- Any measure to eliminate exposure should be considered. - Very high level of containment required, except for short term exposures e.g. taking samples. - Design closed system to allow for easy maintenance. - If possible keep equipment under negative pressure. - Control staff entry to work area. - Ensure all equipment well maintained. - Permit to work for maintenance work. - Regular cleaning of equipment and work area. - Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed. - Training for staff on good practice. - Procedures and training for emergency decontamination and disposal. - Good standard of personal hygiene. - Recording of any 'near miss' situations. - Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection	:	- All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment) - Substance/Task appropriate gloves. - Skin coverage with appropriate barrier material based on potential for contact with the chemicals. - Substance/task appropriate respiratory protection. - Optional face shield. - Eye protection.

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

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

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

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

Contributing scenario controlling worker exposure for 3: Mixing or blending in batch processes

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

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

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

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

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

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

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

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

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

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

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

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

Contributing scenario controlling worker exposure for 6: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

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

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

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

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

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

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

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

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Formulation into mixture

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.0000175 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Freshwater sediment: 0.00558 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water: 0.00000171 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water sediment: 0.000547 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Sewage Treatment Plant: 0 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Soil: 0.00206 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

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

Exposure estimation and reference to its source - Workers: 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.129 mg/m³.
Risk characterisation ratio: 0.239.

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

Exposure estimation and reference to its source - Workers: 3: Mixing or blending in batch processes

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.215 mg/m³.
Risk characterisation ratio: 0.398.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

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

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.108 mg/m³. Risk characterisation ratio: 0.199.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 7: Use as laboratory reagent

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Multi-constituent substance

Product name : Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario : Formulation: Wood preservatives; Biocidal products (PC08).

List of use descriptors : **Identified use name: ES 04** Formulation: Wood preservatives - Industrial: PC08; PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02
Process Category: PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC02
Market sector by type of chemical product: PC08

Environmental contributing scenarios : **Formulation into mixture -** ERC02

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

Number of the ES : 04

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Formulation into mixture

Product characteristics : Liquid.

Amounts used : Annual site tonnage: 27.2 tonnes/year.
Daily amount per site: 0.123 tonnes/day.

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

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:
water: 0.02 % (Estimated release factor).
Local release rate: 0.025 kg/day.
air: 0.000011 % (Estimated release factor).
Local release rate: 0.0000135 kg/day.
Soil: 0 % (Estimated release factor).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.

Organisational measures to prevent/limit release from site : Prevent discharge of undissolved substance to or recover from onsite wastewater.

Conditions and measures related to sewage treatment plant : Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %)
Assumed domestic sewage treatment plant flow 2000 m³/d.
Application of the STP sludge on agricultural soil: Yes.

Conditions and measures related to external treatment of waste for disposal	:	Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics	:	Liquid.
Concentration of substance in mixture or article	:	Covers concentrations up to 100 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Other conditions affecting workers exposure	:	Indoor use. Temperature: ≤40°C.
Technical conditions and measures to control dispersion from source towards the worker	:	Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced.
Organisational measures to prevent/limit releases, dispersion and exposure	:	- Any measure to eliminate exposure should be considered. - Very high level of containment required, except for short term exposures e.g. taking samples. - Design closed system to allow for easy maintenance. - If possible keep equipment under negative pressure. - Control staff entry to work area. - Ensure all equipment well maintained. - Permit to work for maintenance work. - Regular cleaning of equipment and work area. - Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed. - Training for staff on good practice. - Procedures and training for emergency decontamination and disposal. - Good standard of personal hygiene. - Recording of any 'near miss' situations. - Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection	:	- All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment) - Substance/Task appropriate gloves. - Skin coverage with appropriate barrier material based on potential for contact with the chemicals. - Substance/task appropriate respiratory protection. - Optional face shield. - Eye protection.

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

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

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

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

Contributing scenario controlling worker exposure for 3: Mixing or blending in batch processes

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

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

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

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

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

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

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

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

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

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

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

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

Contributing scenario controlling worker exposure for 6: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

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

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

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

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

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

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

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

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Formulation into mixture

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.000902 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.034.

Freshwater sediment: 0.289 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.034.

Marine water: 0.0000902 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.034.

Marine water sediment: 0.029 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.034.

Sewage Treatment Plant: 0.00889 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.068.

Soil: 0.14 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.112.

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

Exposure estimation and reference to its source - Workers: 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.129 mg/m³.
Risk characterisation ratio: 0.239.

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

Exposure estimation and reference to its source - Workers: 3: Mixing or blending in batch processes

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.215 mg/m³.
Risk characterisation ratio: 0.398.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

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

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.108 mg/m³. Risk characterisation ratio: 0.199.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 7: Use as laboratory reagent

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Multi-constituent substance

Product name : Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario : Formulation: Epoxy curing agent; Adhesives, sealants (PC01).

List of use descriptors : **Identified use name: ES 05** Formulation: Epoxy curing agent - Industrial: PC01; PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02
Process Category: PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC02
Market sector by type of chemical product: PC01

Environmental contributing scenarios : **Formulation into mixture -** ERC02

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

Number of the ES : 05

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Formulation into mixture

Product characteristics : Liquid.

Amounts used : Annual site tonnage: 97.3 tonnes/year.
Daily amount per site: 0.442 tonnes/day.

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

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:
water: 0 % (Estimated release factor).
Local release rate: 0 kg/day.
air: 0.0011 % (Estimated release factor).
Local release rate: 0.00486 kg/day.
Soil: 0 % (Estimated release factor).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.

Organisational measures to prevent/limit release from site : Prevent discharge of undissolved substance to or recover from onsite wastewater.

Conditions and measures related to sewage treatment plant : Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %)
Assumed domestic sewage treatment plant flow 2000 m³/d.
Application of the STP sludge on agricultural soil: Yes.

Conditions and measures related to external treatment of waste for disposal	:	Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics	:	Liquid.
Concentration of substance in mixture or article	:	Covers concentrations up to 100 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Other conditions affecting workers exposure	:	Indoor use. Temperature: ≤40°C.
Technical conditions and measures to control dispersion from source towards the worker	:	Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced.
Organisational measures to prevent/limit releases, dispersion and exposure	:	- Any measure to eliminate exposure should be considered. - Very high level of containment required, except for short term exposures e.g. taking samples. - Design closed system to allow for easy maintenance. - If possible keep equipment under negative pressure. - Control staff entry to work area. - Ensure all equipment well maintained. - Permit to work for maintenance work. - Regular cleaning of equipment and work area. - Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed. - Training for staff on good practice. - Procedures and training for emergency decontamination and disposal. - Good standard of personal hygiene. - Recording of any 'near miss' situations. - Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection	:	- All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment) - Substance/Task appropriate gloves. - Skin coverage with appropriate barrier material based on potential for contact with the chemicals. - Substance/task appropriate respiratory protection. - Optional face shield. - Eye protection.

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

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

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

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

Contributing scenario controlling worker exposure for 3: Mixing or blending in batch processes

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

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

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

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

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

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

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

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

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

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

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

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

Contributing scenario controlling worker exposure for 6: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

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

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

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

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

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

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

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

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Formulation into mixture

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.0000175 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Freshwater sediment: 0.00558 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water: 0.00000171 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water sediment: 0.000547 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Sewage Treatment Plant: 0 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Soil: 0.00208 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

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

Exposure estimation and reference to its source - Workers: 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.129 mg/m³.
Risk characterisation ratio: 0.239.

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

Exposure estimation and reference to its source - Workers: 3: Mixing or blending in batch processes

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.215 mg/m³.
Risk characterisation ratio: 0.398.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

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

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.108 mg/m³. Risk characterisation ratio: 0.199.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 7: Use as laboratory reagent

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Multi-constituent substance

Product name : Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario : Formulation: Epoxy curing agent in paint; Coatings and paints, thinners, paint removers (PC09a).

List of use descriptors : **Identified use name: ES 06** Formulation: Epoxy curing agent in paint - Industrial: PC09a; PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15; ERC02
Process Category: PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC02
Market sector by type of chemical product: PC09a

Environmental contributing scenarios : **Formulation into mixture -** ERC02

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

Number of the ES : 06

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Formulation into mixture

Product characteristics : Liquid.

Amounts used : Annual site tonnage: 243 tonnes/year.
Daily amount per site: 1.105 tonnes/day.

Frequency and duration of use : Emission days: ≥243 days per year.

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:
water: 0 % (Estimated release factor).
Local release rate: 0 kg/day.
air: 0.0011 % (Estimated release factor).
Local release rate: 0.012 kg/day.
Soil: 0 % (Estimated release factor).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.

Organisational measures to prevent/limit release from site : Prevent discharge of undissolved substance to or recover from onsite wastewater.

Conditions and measures related to sewage treatment plant : Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %)
Assumed domestic sewage treatment plant flow 2000 m³/d.
Application of the STP sludge on agricultural soil: Yes.

Conditions and measures related to external treatment of waste for disposal : Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics : Liquid.

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

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

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.

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

Organisational measures to prevent/limit releases, dispersion and exposure :
- Any measure to eliminate exposure should be considered.
- Very high level of containment required, except for short term exposures e.g. taking samples.
- Design closed system to allow for easy maintenance.
- If possible keep equipment under negative pressure.
- Control staff entry to work area.
- Ensure all equipment well maintained.
- Permit to work for maintenance work.
- Regular cleaning of equipment and work area.
- Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed.
- Training for staff on good practice.
- Procedures and training for emergency decontamination and disposal.
- Good standard of personal hygiene.
- Recording of any 'near miss' situations.
- Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection :
- All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment)
- Substance/Task appropriate gloves.
- Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
- Substance/task appropriate respiratory protection.
- Optional face shield.
- Eye protection.

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

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

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

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

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

Contributing scenario controlling worker exposure for 3: Mixing or blending in batch processes

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

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

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

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

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

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

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

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

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

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

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

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

Contributing scenario controlling worker exposure for 6: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

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

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

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

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

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

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

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

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Formulation into mixture

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.0000175 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Freshwater sediment: 0.00558 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water: 0.00000171 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water sediment: 0.000547 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Sewage Treatment Plant: 0 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Soil: 0.00211 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

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

Exposure estimation and reference to its source - Workers: 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.129 mg/m³.
Risk characterisation ratio: 0.239.

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

Exposure estimation and reference to its source - Workers: 3: Mixing or blending in batch processes

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.215 mg/m³.
Risk characterisation ratio: 0.398.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

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

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.108 mg/m³. Risk characterisation ratio: 0.199.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 7: Use as laboratory reagent

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Multi-constituent substance

Product name : Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario : Formulation: Coatings, Adhesives and inks; Various products (PC01, PC09a, PC18).

List of use descriptors : **Identified use name: ES 07:** Formulation: Coatings, Adhesives and inks - Industrial: PC01, PC09a, PC18; PROC01, PROC02, PROC03, PROC04, PROC05, PROC08b, PROC09; ERC02
Process Category: PROC01, PROC02, PROC03, PROC04, PROC05, PROC08b, PROC09
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC02
Market sector by type of chemical product: PC01, PC09a, PC18

Environmental contributing scenarios : **Formulation into mixture -** ERC02

Health Contributing scenarios : **Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions -** PROC01
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC02
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition - PROC03
Chemical production where opportunity for exposure arises - PROC04
Mixing or blending in batch processes - PROC05
Transfer of substance or mixture (charging and discharging) at dedicated facilities - PROC08b
Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC09

Number of the ES : 07

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Formulation into mixture

Product characteristics : Liquid.

Amounts used : Annual site tonnage: 2560 tonnes/year.
Daily amount per site: 7.014 tonnes/day.

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

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:
water: 0.001 % (Estimated release factor).
Local release rate: 0.07 kg/day.
air: 0 % (Estimated release factor).
Local release rate: 0 kg/day.
Soil: 0 % (Estimated release factor).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.

Organisational measures to prevent/limit release from site	:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %) Assumed domestic sewage treatment plant flow 2000 m³/d. Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal	:	Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics	:	Liquid.
Concentration of substance in mixture or article	:	Covers concentrations up to 100 %.
Other conditions affecting workers exposure	:	Indoor use. Temperature: ≤40°C.
Technical conditions and measures to control dispersion from source towards the worker	:	Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced.
Organisational measures to prevent/limit releases, dispersion and exposure	:	- Any measure to eliminate exposure should be considered. - Very high level of containment required, except for short term exposures e.g. taking samples. - Design closed system to allow for easy maintenance. - If possible keep equipment under negative pressure. - Control staff entry to work area. - Ensure all equipment well maintained. - Permit to work for maintenance work. - Regular cleaning of equipment and work area. - Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed. - Training for staff on good practice. - Procedures and training for emergency decontamination and disposal. - Good standard of personal hygiene. - Recording of any 'near miss' situations. - Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection	:	- All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment) - Substance/Task appropriate gloves. - Skin coverage with appropriate barrier material based on potential for contact with the chemicals. - Substance/task appropriate respiratory protection. - Optional face shield. - Eye protection.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Contributing scenario controlling worker exposure for 5: Chemical production where opportunity for exposure arises

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

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

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

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

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

Contributing scenario controlling worker exposure for 6: Mixing or blending in batch processes

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

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

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

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

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

Contributing scenario controlling worker exposure for 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

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

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

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

Contributing scenario controlling worker exposure for 8: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

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

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

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

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Formulation into mixture

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.00254 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.095.

Freshwater sediment: 0.813 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.095.

Marine water: 0.000254 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.095.

Marine water sediment: 0.081 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.095.

Sewage Treatment Plant: 0.025 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.195.

Soil: 0.395 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.316.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.072 mg/m³.
Risk characterisation ratio: 0.133.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

Exposure estimation and reference to its source - Workers: 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.129 mg/m³. Risk characterisation ratio: 0.239.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 5: Chemical production where opportunity for exposure arises

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: Mixing or blending in batch processes

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.108 mg/m³. Risk characterisation ratio: 0.199.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 8: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Multi-constituent substance

Product name : Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario : Use at industrial sites: Ashless dispersant; Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents (PC20).

List of use descriptors : **Identified use name: ES 08:** Use at industrial sites: Ashless dispersant - Industrial: PC20; PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15; ERC06a
Process Category: PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC06a
Market sector by type of chemical product: PC20

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

Health Contributing scenarios : **Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions -** PROC01
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC02
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition - PROC03
Chemical production where opportunity for exposure arises - PROC04
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - PROC08a
Transfer of substance or mixture (charging and discharging) at dedicated facilities - PROC08b
Use as laboratory reagent - PROC15

Number of the ES : 08

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Use of intermediate

Product characteristics : Liquid.

Amounts used : Annual site tonnage: 1160 tonnes/year.
Daily amount per site: 3.867 tonnes/day.

Frequency and duration of use : Emission days: ≥300 days per year.

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:
water: 0 % (Estimated release factor).
Local release rate: 0 kg/day.
air: 0.0011 % (Estimated release factor).
Local release rate: 0.043 kg/day.
Soil: 0 % (Estimated release factor).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.

Organisational measures to prevent/limit release from site	:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %) Assumed domestic sewage treatment plant flow 2000 m³/d. Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal	:	Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics	:	Liquid.
Concentration of substance in mixture or article	:	Covers concentrations up to 100 %.
Other conditions affecting workers exposure	:	Indoor use. Temperature: ≤40°C.
Technical conditions and measures to control dispersion from source towards the worker	:	Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced.
Organisational measures to prevent/limit releases, dispersion and exposure	:	- Any measure to eliminate exposure should be considered. - Very high level of containment required, except for short term exposures e.g. taking samples. - Design closed system to allow for easy maintenance. - If possible keep equipment under negative pressure. - Control staff entry to work area. - Ensure all equipment well maintained. - Permit to work for maintenance work. - Regular cleaning of equipment and work area. - Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed. - Training for staff on good practice. - Procedures and training for emergency decontamination and disposal. - Good standard of personal hygiene. - Recording of any 'near miss' situations. - Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection	:	- All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment) - Substance/Task appropriate gloves. - Skin coverage with appropriate barrier material based on potential for contact with the chemicals. - Substance/task appropriate respiratory protection. - Optional face shield. - Eye protection.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Contributing scenario controlling worker exposure for 5: Chemical production where opportunity for exposure arises

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

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

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

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

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

Contributing scenario controlling worker exposure for 6: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

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

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

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

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

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

Contributing scenario controlling worker exposure for 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

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

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

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

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

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

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

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

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Use of intermediate

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.0000175 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Freshwater sediment: 0.00558 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water: 0.00000171 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water sediment: 0.000547 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Sewage Treatment Plant: 0 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Soil: 0.00227 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.072 mg/m³.
Risk characterisation ratio: 0.133.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

Exposure estimation and reference to its source - Workers: 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.129 mg/m³.
Risk characterisation ratio: 0.239.

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

Exposure estimation and reference to its source - Workers: 5: Chemical production where opportunity for exposure arises

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.215 mg/m³.
Risk characterisation ratio: 0.398.

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

Exposure estimation and reference to its source - Workers: 6: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

Exposure estimation and reference to its source - Workers: 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.108 mg/m³.
Risk characterisation ratio: 0.199.

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

Exposure estimation and reference to its source - Workers: 8: Use as laboratory reagent

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Multi-constituent substance

Product name : Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario : Use at industrial sites: Diesel and gasoline additive; Fuels (PC13).

List of use descriptors : **Identified use name: ES 09:** Use at industrial sites: Diesel and gasoline additive - Industrial: PC13; PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15; ERC06a
Process Category: PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC06a
Market sector by type of chemical product: PC13

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

Health Contributing scenarios : **Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions -** PROC01
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC02
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition - PROC03
Chemical production where opportunity for exposure arises - PROC04
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - PROC08a
Transfer of substance or mixture (charging and discharging) at dedicated facilities - PROC08b
Use as laboratory reagent - PROC15

Number of the ES : 09

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Use of intermediate

Product characteristics : Liquid.

Amounts used : Annual site tonnage: 0.58 tonnes/year.
Daily amount per site: 0.00159 tonnes/day.

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

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:
water: 0 % (Estimated release factor).
Local release rate: 0 kg/day.
air: 0.0011 % (Estimated release factor).
Local release rate: 0.0000175 kg/day.
Soil: 0 % (Estimated release factor).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.

Organisational measures to prevent/limit release from site : Prevent discharge of undissolved substance to or recover from onsite wastewater.

Conditions and measures related to sewage treatment plant : Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %)
Assumed domestic sewage treatment plant flow 2000 m³/d.
Application of the STP sludge on agricultural soil: Yes.

Conditions and measures related to external treatment of waste for disposal : Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics : Liquid.

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

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.

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

Organisational measures to prevent/limit releases, dispersion and exposure : - Any measure to eliminate exposure should be considered.
- Very high level of containment required, except for short term exposures e.g. taking samples.
- Design closed system to allow for easy maintenance.
- If possible keep equipment under negative pressure.
- Control staff entry to work area.
- Ensure all equipment well maintained.
- Permit to work for maintenance work.
- Regular cleaning of equipment and work area.
- Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed.
- Training for staff on good practice.
- Procedures and training for emergency decontamination and disposal.
- Good standard of personal hygiene.
- Recording of any 'near miss' situations.
- Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection : - All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment)
- Substance/Task appropriate gloves.
- Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
- Substance/task appropriate respiratory protection.
- Optional face shield.
- Eye protection.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Contributing scenario controlling worker exposure for 5: Chemical production where opportunity for exposure arises

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

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

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

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

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

Contributing scenario controlling worker exposure for 6: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

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

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

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

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

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

Contributing scenario controlling worker exposure for 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

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

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

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

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

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

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

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

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Use of intermediate

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.0000175 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Freshwater sediment: 0.00558 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water: 0.00000171 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water sediment: 0.000547 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Sewage Treatment Plant: 0 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Soil: 0.00206 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.072 mg/m³.
Risk characterisation ratio: 0.133.

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

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

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.43 mg/m³. Risk characterisation ratio: 0.796.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.129 mg/m³. Risk characterisation ratio: 0.239.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 5: Chemical production where opportunity for exposure arises

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.43 mg/m³. Risk characterisation ratio: 0.796.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.108 mg/m³. Risk characterisation ratio: 0.199.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 8: Use as laboratory reagent

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Multi-constituent substance

Product name : Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario : Use at industrial sites: Wood preservatives; Biocidal products (PC08).

List of use descriptors : **Identified use name: ES 10:** Use at industrial sites: Wood preservatives - Industrial: PC08; PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15; ERC06a
Process Category: PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC06a
Market sector by type of chemical product: PC08

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

Health Contributing scenarios : **Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions -** PROC01
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC02
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition - PROC03
Chemical production where opportunity for exposure arises - PROC04
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - PROC08a
Transfer of substance or mixture (charging and discharging) at dedicated facilities - PROC08b
Use as laboratory reagent - PROC15

Number of the ES : 10

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Use of intermediate

Product characteristics : Liquid.

Amounts used : Annual site tonnage: 27.2 tonnes/year.
Daily amount per site: 0.123 tonnes/day.

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

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:
water: 0.02 % (Estimated release factor).
Local release rate: 0.025 kg/day.
air: 0.000011 % (Estimated release factor).
Local release rate: 0.0000135 kg/day.
Soil: 0 % (Estimated release factor).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.

Organisational measures to prevent/limit release from site : Prevent discharge of undissolved substance to or recover from onsite wastewater.

Conditions and measures related to sewage treatment plant : Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %)
Assumed domestic sewage treatment plant flow 2000 m³/d.
Application of the STP sludge on agricultural soil: Yes.

Conditions and measures related to external treatment of waste for disposal : Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics : Liquid.

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

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.

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

Organisational measures to prevent/limit releases, dispersion and exposure : - Any measure to eliminate exposure should be considered.
- Very high level of containment required, except for short term exposures e.g. taking samples.
- Design closed system to allow for easy maintenance.
- If possible keep equipment under negative pressure.
- Control staff entry to work area.
- Ensure all equipment well maintained.
- Permit to work for maintenance work.
- Regular cleaning of equipment and work area.
- Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed.
- Training for staff on good practice.
- Procedures and training for emergency decontamination and disposal.
- Good standard of personal hygiene.
- Recording of any 'near miss' situations.
- Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection : - All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment)
- Substance/Task appropriate gloves.
- Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
- Substance/task appropriate respiratory protection.
- Optional face shield.
- Eye protection.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Contributing scenario controlling worker exposure for 5: Chemical production where opportunity for exposure arises

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

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

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

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

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

Contributing scenario controlling worker exposure for 6: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

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

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

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

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

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

Contributing scenario controlling worker exposure for 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

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

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

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

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

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

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

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

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Use of intermediate

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.000902 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.034.

Freshwater sediment: 0.289 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.034.

Marine water: 0.0000902 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.034.

Marine water sediment: 0.029 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.034.

Sewage Treatment Plant: 0.00889 mg/l.
Risk characterisation ratio (PEC/PNEC): 0.068.

Soil: 0.14 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): 0.112.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.072 mg/m³.
Risk characterisation ratio: 0.133.

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

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

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.43 mg/m³. Risk characterisation ratio: 0.796.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.129 mg/m³. Risk characterisation ratio: 0.239.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 5: Chemical production where opportunity for exposure arises

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.43 mg/m³. Risk characterisation ratio: 0.796.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.108 mg/m³. Risk characterisation ratio: 0.199.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 8: Use as laboratory reagent

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Multi-constituent substance

Product name : Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario : Use at industrial sites: Epoxy curing agent; Adhesives, sealants (PC01).

List of use descriptors : **Identified use name: ES 11:** Use at industrial sites: Epoxy curing agent - Industrial: PC01; PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15; ERC06a
Process Category: PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC06a
Market sector by type of chemical product: PC01

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

Health Contributing scenarios : **Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions -** PROC01
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC02
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition - PROC03
Chemical production where opportunity for exposure arises - PROC04
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - PROC08a
Transfer of substance or mixture (charging and discharging) at dedicated facilities - PROC08b
Use as laboratory reagent - PROC15

Number of the ES : 11

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Use of intermediate

Product characteristics : Liquid.

Amounts used : Annual site tonnage: 97.3 tonnes/year.
Daily amount per site: 0.442 tonnes/day.

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

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:
water: 0 % (Estimated release factor).
Local release rate: 0 kg/day.
air: 0.0011 % (Estimated release factor).
Local release rate: 0.00486 kg/day.
Soil: 0 % (Estimated release factor).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.

Organisational measures to prevent/limit release from site : Prevent discharge of undissolved substance to or recover from onsite wastewater.

Conditions and measures related to sewage treatment plant : Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %)
Assumed domestic sewage treatment plant flow 2000 m³/d.
Application of the STP sludge on agricultural soil: Yes.

Conditions and measures related to external treatment of waste for disposal : Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics : Liquid.

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

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

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.

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

Organisational measures to prevent/limit releases, dispersion and exposure :
- Any measure to eliminate exposure should be considered.
- Very high level of containment required, except for short term exposures e.g. taking samples.
- Design closed system to allow for easy maintenance.
- If possible keep equipment under negative pressure.
- Control staff entry to work area.
- Ensure all equipment well maintained.
- Permit to work for maintenance work.
- Regular cleaning of equipment and work area.
- Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed.
- Training for staff on good practice.
- Procedures and training for emergency decontamination and disposal.
- Good standard of personal hygiene.
- Recording of any 'near miss' situations.
- Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection :
- All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment)
- Substance/Task appropriate gloves.
- Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
- Substance/task appropriate respiratory protection.
- Optional face shield.
- Eye protection.

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

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

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

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

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

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

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

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

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

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

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

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

Contributing scenario controlling worker exposure for 5: Chemical production where opportunity for exposure arises

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

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

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

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

Contributing scenario controlling worker exposure for 6: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

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

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

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

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

Contributing scenario controlling worker exposure for 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

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

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

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

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

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Use of intermediate

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.0000175 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Freshwater sediment: 0.00558 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water: 0.00000171 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water sediment: 0.000547 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Sewage Treatment Plant: 0 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Soil: 0.00208 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.043 mg/m³.
Risk characterisation ratio: 0.08.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

Exposure estimation and reference to its source - Workers: 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.129 mg/m³. Risk characterisation ratio: 0.239.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 5: Chemical production where opportunity for exposure arises

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.43 mg/m³. Risk characterisation ratio: 0.796.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.108 mg/m³. Risk characterisation ratio: 0.199.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 8: Use as laboratory reagent

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Multi-constituent substance

Product name : Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario : Use at industrial sites: Epoxy curing agent in paint; Coatings and paints, thinners, paint removers (PC09a).

List of use descriptors : **Identified use name: ES 12:** Use at industrial sites: Epoxy curing agent in paint - Industrial: PC09a; PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15; ERC06a
Process Category: PROC01, PROC02, PROC03, PROC04, PROC08a, PROC08b, PROC15
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC06a
Market sector by type of chemical product: PC09a

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

Health Contributing scenarios : **Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions -** PROC01
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC02
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition - PROC03
Chemical production where opportunity for exposure arises - PROC04
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - PROC08a
Transfer of substance or mixture (charging and discharging) at dedicated facilities - PROC08b
Use as laboratory reagent - PROC15

Number of the ES : 12

Section 2 - Exposure controls

Contributing scenario controlling environmental exposure for 1: Use of intermediate

Product characteristics : Liquid.

Amounts used : Annual site tonnage: 0.243 tonnes/year.
Daily amount per site: 1.105 tonnes/day.

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

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:
water: 0 % (Estimated release factor).
Local release rate: 0 kg/day.
air: 0.0011 % (Estimated release factor).
Local release rate: 0.012 kg/day.
Soil: 0 % (Estimated release factor).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil : Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.

Organisational measures to prevent/limit release from site	:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %) Assumed domestic sewage treatment plant flow 2000 m³/d. Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal	:	Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics	:	Liquid.
Concentration of substance in mixture or article	:	Covers concentrations up to 100 %.
Other conditions affecting workers exposure	:	Indoor use. Temperature: ≤40°C.
Technical conditions and measures to control dispersion from source towards the worker	:	Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced.
Organisational measures to prevent/limit releases, dispersion and exposure	:	- Any measure to eliminate exposure should be considered. - Very high level of containment required, except for short term exposures e.g. taking samples. - Design closed system to allow for easy maintenance. - If possible keep equipment under negative pressure. - Control staff entry to work area. - Ensure all equipment well maintained. - Permit to work for maintenance work. - Regular cleaning of equipment and work area. - Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed. - Training for staff on good practice. - Procedures and training for emergency decontamination and disposal. - Good standard of personal hygiene. - Recording of any 'near miss' situations. - Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection	:	- All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment) - Substance/Task appropriate gloves. - Skin coverage with appropriate barrier material based on potential for contact with the chemicals. - Substance/task appropriate respiratory protection. - Optional face shield. - Eye protection.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Contributing scenario controlling worker exposure for 5: Chemical production where opportunity for exposure arises

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

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

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

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

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

Contributing scenario controlling worker exposure for 6: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

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

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

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

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

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

Contributing scenario controlling worker exposure for 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

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

Technical conditions and measures to control dispersion from source towards the worker : Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

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

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

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

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

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

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Use of intermediate

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.0000175 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Freshwater sediment: 0.00558 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water: 0.00000171 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water sediment: 0.000547 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Sewage Treatment Plant: 0 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Soil: 0.00206 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.072 mg/m³.
Risk characterisation ratio: 0.133.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

Exposure estimation and reference to its source - Workers: 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.129 mg/m³.
Risk characterisation ratio: 0.239.

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

Exposure estimation and reference to its source - Workers: 5: Chemical production where opportunity for exposure arises

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.215 mg/m³.
Risk characterisation ratio: 0.398.

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

Exposure estimation and reference to its source - Workers: 6: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.43 mg/m³.
Risk characterisation ratio: 0.796.

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

Exposure estimation and reference to its source - Workers: 7: Transfer of substance or mixture (charging and discharging) at dedicated facilities

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.108 mg/m³.
Risk characterisation ratio: 0.199.

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

Exposure estimation and reference to its source - Workers: 8: Use as laboratory reagent

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition : Multi-constituent substance

Product name : Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario : Use at industrial sites.

List of use descriptors : **Identified use name: ES 13:** Use at industrial sites: Processing aid - Industrial: PROC01, PROC02, PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC12, PROC13, PROC14, PROC15; ERC04
Process Category: PROC01, PROC02, PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC12, PROC13, PROC14, PROC15
Subsequent service life relevant for that use: No.
Environmental Release Category: ERC04

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

Health Contributing scenarios : **Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions -** PROC01
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC02
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition - PROC03
Chemical production where opportunity for exposure arises - PROC04
Mixing or blending in batch processes - PROC05
Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - PROC08a
Transfer of substance or mixture (charging and discharging) at dedicated facilities - PROC08b
Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC09
Use of blowing agents in manufacture of foam - PROC12
Treatment of articles by dipping and pouring - PROC13
Tabletting, compression, extrusion, pelletisation, granulation - PROC14
Use as laboratory reagent - PROC15

Number of the ES : 13

Section 2 - Exposure controls

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

Product characteristics : Liquid.

Amounts used : Annual site tonnage: 100 tonnes/year.
Daily amount per site: 0.333 tonnes/day.

Frequency and duration of use : Emission days: ≥300 days per year.

Other conditions affecting environmental exposure : Receiving surface water flow ≥18000 m³/d.

Release factor after on-site risk management:
water: 0 % (Estimated release factor).
Local release rate: 0 kg/day.
air: 0.0011 % (Estimated release factor).
Local release rate: 0.00367 kg/day.
Soil: 0 % (Estimated release factor).

Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil	:	Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.
Organisational measures to prevent/limit release from site	:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %) Assumed domestic sewage treatment plant flow 2000 m³/d. Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal	:	Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics	:	Liquid.
Concentration of substance in mixture or article	:	Covers concentrations up to 100 %.
Other conditions affecting workers exposure	:	Indoor use. Temperature: ≤40°C.
Technical conditions and measures to control dispersion from source towards the worker	:	Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced.
Organisational measures to prevent/limit releases, dispersion and exposure	:	- Any measure to eliminate exposure should be considered. - Very high level of containment required, except for short term exposures e.g. taking samples. - Design closed system to allow for easy maintenance. - If possible keep equipment under negative pressure. - Control staff entry to work area. - Ensure all equipment well maintained. - Permit to work for maintenance work. - Regular cleaning of equipment and work area. - Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed. - Training for staff on good practice. - Procedures and training for emergency decontamination and disposal. - Good standard of personal hygiene. - Recording of any 'near miss' situations. - Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection	:	- All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment) - Substance/Task appropriate gloves. - Skin coverage with appropriate barrier material based on potential for contact with the chemicals. - Substance/task appropriate respiratory protection. - Optional face shield. - Eye protection.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Contributing scenario controlling worker exposure for 5: Chemical production where opportunity for exposure arises

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

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

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

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

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

Contributing scenario controlling worker exposure for 6: Mixing or blending in batch processes

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

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

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

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

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

Contributing scenario controlling worker exposure for 7: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

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

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

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

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

Contributing scenario controlling worker exposure for 8: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 95 %.

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

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

Contributing scenario controlling worker exposure for 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

Contributing scenario controlling worker exposure for 10: Use of blowing agents in manufacture of foam

Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

Contributing scenario controlling worker exposure for 11: Treatment of articles by dipping and pouring

Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %.

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

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

Contributing scenario controlling worker exposure for 12: Tabletting, compression, extrusion, pelletisation, granulation

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

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

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

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

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

Contributing scenario controlling worker exposure for 13: Use as laboratory reagent

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

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

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

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Exposure assessment (environment): : EUSES 2.1.2.

Exposure estimation : Freshwater: 0.0000175 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Freshwater sediment: 0.00558 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water: 0.00000171 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Marine water sediment: 0.000547 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

Sewage Treatment Plant: 0 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Soil: 0.00208 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

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

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

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.072 mg/m³.
Risk characterisation ratio: 0.133.

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

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

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.43 mg/m³. Risk characterisation ratio: 0.796.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.129 mg/m³. Risk characterisation ratio: 0.239.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 5: Chemical production where opportunity for exposure arises

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: Mixing or blending in batch processes

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 7: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.43 mg/m³. Risk characterisation ratio: 0.796.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 8: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.108 mg/m³. Risk characterisation ratio: 0.199.

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

Exposure estimation and reference to its source - Workers: 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 10: Use of blowing agents in manufacture of foam

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.086 mg/m³. Risk characterisation ratio: 0.159.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 11: Treatment of articles by dipping and pouring

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.43 mg/m³. Risk characterisation ratio: 0.796.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 12: Tabletting, compression, extrusion, pelletisation, granulation

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 13: Use as laboratory reagent

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.215 mg/m³. Risk characterisation ratio: 0.398.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition	:	Multi-constituent substance
Product name	:	Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario	:	Use at industrial sites: Coatings, Adhesives and inks; Various products (PC01, PC09a, PC18).
List of use descriptors	:	**Identified use name: ES 14:** Use at industrial sites: Coatings, Adhesives and inks - Industrial: PC01, PC09a, PC18; PROC02, PROC05, PROC07, PROC08b, PROC09, PROC10, PROC13; ERC04 **Process Category:** PROC02, PROC05, PROC07, PROC08b, PROC10, PROC13 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC04 **Market sector by type of chemical product:** PC01, PC09a, PC18
Environmental contributing scenarios	:	**Use of non-reactive processing aid at industrial site (no inclusion into or onto article) -** ERC04
Health Contributing scenarios	:	**Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions -** PROC02 **Mixing or blending in batch processes -** PROC05 **Industrial spraying -** PROC07 **Transfer of substance or mixture (charging and discharging) at dedicated facilities -** PROC08b **Roller application or brushing -** PROC10 **Treatment of articles by dipping and pouring -** PROC13
Number of the ES	:	14

Section 2 - Exposure controls

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

Product characteristics	:	Liquid.
Amounts used	:	Annual site tonnage: 2560 tonnes/year. Daily amount per site: 7.014 tonnes/day.
Frequency and duration of use	:	Emission days: ≥365 days per year.
Other conditions affecting environmental exposure	:	Receiving surface water flow ≥18000 m³/d. Release factor after on-site risk management: water: 0 % (Estimated release factor). Local release rate: 0 kg/day. air: 0.01 % (Estimated release factor). Local release rate: 0.701 kg/day. Soil: 0.005 % (Estimated release factor).
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil	:	Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.
Organisational measures to prevent/limit release from site	:	Prevent discharge of undissolved substance to or recover from onsite wastewater.
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %) Assumed domestic sewage treatment plant flow 2000 m³/d. Application of the STP sludge on agricultural soil: Yes.

Conditions and measures related to external treatment of waste for disposal : Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for: All Contributing scenarios

Product characteristics : Liquid.

Organisational measures to prevent/limit releases, dispersion and exposure :
- Any measure to eliminate exposure should be considered.
- Very high level of containment required, except for short term exposures e.g. taking samples.
- Design closed system to allow for easy maintenance.
- If possible keep equipment under negative pressure.
- Control staff entry to work area.
- Ensure all equipment well maintained.
- Permit to work for maintenance work.
- Regular cleaning of equipment and work area.
- Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed.
- Training for staff on good practice.
- Procedures and training for emergency decontamination and disposal.
- Good standard of personal hygiene.
- Recording of any 'near miss' situations.
- Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection :
- All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment)
- Substance/Task appropriate gloves.
- Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
- Substance/task appropriate respiratory protection.
- Optional face shield.
- Eye protection.

Contributing scenario controlling worker exposure for 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product characteristics : Covers concentrations up to 100 %.

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

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.

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

Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Advanced

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

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

Contributing scenario controlling worker exposure for 3: Mixing or blending in batch processes

Product characteristics : Covers concentrations up to 25 %.

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

Other conditions affecting workers exposure : Indoor use.
Temperature: ≤40°C.

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

Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Occupational Health and Safety Management System: Advanced

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

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

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

Contributing scenario controlling worker exposure for 4: Industrial spraying

Product characteristics	:	Covers concentrations up to 25 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours. Frequency: 4-5 days per week.
Other conditions affecting workers exposure	:	Distance of worker from source: <1 m (emission source within breathing zone of the worker) Task is followed by a period of evaporation, drying or curing. Ensure that the task is not carried out by more than one worker simultaneously. Room size: 100-1000 m³.
Technical conditions and measures to control dispersion from source towards the worker	:	General ventilation: Mechanical ventilation: Inhalation - minimum efficiency of 44 %.

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

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

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

Product characteristics	:	Covers concentrations up to 25 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Other conditions affecting workers exposure	:	Indoor use. Temperature: ≤40°C.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 95 %. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced

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

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

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

Product characteristics	:	Covers concentrations up to 25 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours. Frequency: 4-5 days per week.
Other conditions affecting workers exposure	:	Distance of worker from source: <1 m (emission source within breathing zone of the worker) Task is followed by a period of evaporation, drying or curing. Ensure that the task is not carried out by more than one worker simultaneously. Room size: 100-1000 m³.
Technical conditions and measures to control dispersion from source towards the worker	:	General ventilation: Mechanical ventilation: Inhalation - minimum efficiency of 44 %.

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

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

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

Product characteristics	:	Covers concentrations up to 25 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Other conditions affecting workers exposure	:	Indoor use. Temperature: ≤40°C.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced

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

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

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Exposure assessment (environment):	:	EUSES 2.1.2.
Exposure estimation	:	Freshwater: 0.0000175 mg/l. Risk characterisation ratio (PEC/PNEC): <0.01. Freshwater sediment: 0.00558 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01. Marine water: 0.00000171 mg/l. Risk characterisation ratio (PEC/PNEC): <0.01. Marine water sediment: 0.000547 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01. Sewage Treatment Plant: 0 mg/l. Risk characterisation ratio (PEC/PNEC): <0.01. Soil: 0.00619 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01.
Remark	:	Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.43 mg/m³. Risk characterisation ratio: 0.796.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 3: Mixing or blending in batch processes

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.129 mg/m³. Risk characterisation ratio: 0.239.

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

Exposure estimation and reference to its source - Workers: 4: Industrial spraying

Exposure assessment (human):	:	Stoffenmanager v7.5.2 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.35 mg/m³. Risk characterisation ratio: 0.648.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.065 mg/m³. Risk characterisation ratio: 0.119.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 6: Roller application or brushing

Exposure assessment (human):	:	Stoffenmanager v7.5.2 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.16 mg/m³. Risk characterisation ratio: 0.296.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

Exposure estimation and reference to its source - Workers: 7: Treatment of articles by dipping and pouring

Exposure assessment (human):	:	ECETOC TRA worker v3 Inhalation, local, short-term/long-term; Inhalation, systemic, short-term; Dermal, systemic/local, short-term/long-term; Eye, local: Qualitative approach used to conclude safe use.
Exposure estimation	:	**Worker - inhalative, long-term - systemic:** 0.258 mg/m³. Risk characterisation ratio: 0.478.
Remark	:	Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR < 1).

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

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

Annex to the extended Safety Data Sheet (eSDS)

Industrial

Identification of the substance or mixture

Product definition	:	Multi-constituent substance
Product name	:	Triethylenetetramine, TETA

Section 1 - Title

Short title of the exposure scenario	:	Use at industrial sites: Use as laboratory reagent; Laboratory chemicals (PC21).
List of use descriptors	:	**Identified use name: ES 15:** Use at industrial sites: Use as laboratory reagent - Industrial: PC21; PROC15; ERC04 **Process Category:** PROC15 **Subsequent service life relevant for that use:** No. **Environmental Release Category:** ERC04 **Market sector by type of chemical product:** PC21
Environmental contributing scenarios	:	**Use of non-reactive processing aid at industrial site (no inclusion into or onto article) -** ERC04
Health Contributing scenarios	:	**Use as laboratory reagent -** PROC15
Number of the ES	:	15

Section 2 - Exposure controls

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

Product characteristics	:	Liquid.
Amounts used	:	Annual site tonnage: 1 tonnes/year. Daily amount per site: 0.0033 tonnes/day.
Frequency and duration of use	:	Emission days: ≥300 days per year.
Other conditions affecting environmental exposure	:	Receiving surface water flow ≥18000 m³/d. Release factor after on-site risk management: water: 0 % (Estimated release factor). Local release rate: 0 kg/day. air: 0.01 % (Estimated release factor). Local release rate: 0.00033 kg/day. Soil: 0 % (Estimated release factor).
Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil	:	Treat on-site wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥27.7 %.
Conditions and measures related to sewage treatment plant	:	Sewage Treatment Plant: Yes. (Efficiency of at least 27.7 %) Assumed domestic sewage treatment plant flow 2000 m³/d. Application of the STP sludge on agricultural soil: Yes.
Conditions and measures related to external treatment of waste for disposal	:	Particular considerations on the waste treatment operations.

Contributing scenario controlling worker exposure for 2: Use as laboratory reagent

Product characteristics	:	Liquid.
Concentration of substance in mixture or article	:	Covers concentrations up to 100 %.
Frequency and duration of use/exposure	:	Exposure duration per day: ≤4 hours.
Other conditions affecting workers exposure	:	Indoor use. Temperature: ≤40°C.
Technical conditions and measures to control dispersion from source towards the worker	:	Local exhaust ventilation: Inhalation - minimum efficiency of 90 %. Provide a basic standard of general ventilation (1 to 3 air changes per hour). Occupational Health and Safety Management System: Advanced
Organisational measures to prevent/limit releases, dispersion and exposure	:	- Any measure to eliminate exposure should be considered. - Very high level of containment required, except for short term exposures e.g. taking samples. - Design closed system to allow for easy maintenance. - If possible keep equipment under negative pressure. - Control staff entry to work area. - Ensure all equipment well maintained. - Permit to work for maintenance work. - Regular cleaning of equipment and work area. - Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed. - Training for staff on good practice. - Procedures and training for emergency decontamination and disposal. - Good standard of personal hygiene. - Recording of any 'near miss' situations. - Sensitizers - Without prejudice to relevant national legislation, pre-employment screening and appropriate health surveillance.

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

Personal protection	:	Wear chemical-resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 %. - All skin and mucous membranes with potential exposure protected with appropriate PPE (personal protective equipment) - Substance/Task appropriate gloves. - Skin coverage with appropriate barrier material based on potential for contact with the chemicals. - Substance/task appropriate respiratory protection. - Optional face shield. - Eye protection.
Respiratory protection	:	Wear respiratory protection. Inhalation - minimum efficiency of 90 %.

Section 3 - Exposure estimation and reference to its source

Exposure estimation and reference to its source - Environment: 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Exposure assessment (environment):	:	EUSES 2.1.2.
Exposure estimation	:	Freshwater: 0.0000175 mg/l. Risk characterisation ratio (PEC/PNEC): <0.01. Freshwater sediment: 0.00558 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01. Marine water: 0.00000171 mg/l. Risk characterisation ratio (PEC/PNEC): <0.01. Marine water sediment: 0.000547 mg/kg dwt. Risk characterisation ratio (PEC/PNEC): <0.01.

Sewage Treatment Plant: 0 mg/l.
Risk characterisation ratio (PEC/PNEC): <0.01.

Soil: 0.00206 mg/kg dwt.
Risk characterisation ratio (PEC/PNEC): <0.01.

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

Exposure estimation and reference to its source - Workers: 2: Use as laboratory reagent

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

Exposure estimation : **Worker - inhalative, long-term - systemic:** 0.215 mg/m³.
Risk characterisation ratio: 0.398.

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

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

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