APPLICATION FOR AN ENVIRONMENTAL PERMIT VARIATION UNDER THE ENVIRONMENTAL PERMITTING (ENGLAND AND WALES) REGULATIONS 2016 (AS AMENDED)

AIR EMISSIONS RISK ASSESSMENT

Industrial Waxes Limited

ABRIL INDUSTRIAL WAXES LIMITED,
STURMI WAY, VILLAGE FARM INDUSTRIAL ESTATE,
PYLE, BRIDGEND, CF33 6BZ

ECL Ref: AIWL.01.01/H1(Air)
August 2024
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LIST OF ACRONYMS / TERMS USED

Abril	**Abril Industrial Waxes Limited**
AQS	**Air Quality Standard**
EA	**Environment Agency**
EAL	**Environmental Assessment Level**
ECL	**Environmental Compliance Limited**
EP	**Environmental Permit**
MEA	**Monoethanolamine**
New Diamine	**3,3'-(butane-1,4-diylbis(oxy))bispropaneamine (Baxxodur EC 280, or similar)**
RW	**Natural Resources Wales**
PC	**Process Contribution**
SDS	**Safety Data Sheet**
The Installation	**Area contained within the Environmental Permit boundary at Abril Industrial Waxes Limited**
VOC	**Volatile Organic Compound**

1. H1 Assessment

1.1 Overview

1.1.1. Environmental Compliance Limited ("ECL") were commissioned by Abril Industrial Waxes Limited (hereafter referred to as "Abril") to undertake a H1 Assessment of emissions arising from their emission points to air at their activity located at Sturmi Way, Village Farm Industrial Estate, Pyle, Bridgend, CF33 6BZ ("the Installation"). The H1 assessment will form part of the Environmental Permit ("EP") variation application for the Installation.

1.1.2. As part of changes to production at the Installation, Abril is proposing to install a new process line which will necessitate additional raw materials, namely: 3,3'-(butane-1,4-diylbis(oxy))bispropaneamine (Baxxodur EC 280, or similar) – hereafter referred to as "New Diamine" – and a new emission point to air; to be designated A15 (refer to the Drawings provided in Section 5 of this application submission for details). A copy of the Safety Data Sheet ("SDS") for Baxxodur EC 280 may be found in Appendix I.

1.1.3. The assessment was undertaken for existing emission points A2, A3, A12 and A14 for releases of particulate matter (it should be noted that, in regard to Installation's EP, emission point A4 is no longer in use as the Flacker is now connected to emission point A2).

1.1.4. For proposed emission point A15, based on the SDS (see Appendix I) and the Environment Agency's ("EA") list of substances with declared environmental assessment levels ("EALs"), the assessment considered emissions of volatile organic compounds ("VOCs") as monoethanolamine ("MEA").

1.1.5. The calculation sheet for the H1 screening assessment is presented within Appendix II of this document. The assessment has been undertaken using the approach detailed in the EA online guidance – Air Emissions Risk Assessment for your Environmental Permit[1], which Natural Resources Wales ("NRW") approve the use of.

1.1.6. The emissions data utilised in the assessment was confirmed or estimated by Abril or their technology providers.

1.1.7. For A15, following Abril's consultation with the provider of the proposed New Diamine handling system, it was calculated that, based on Baxxodur EC 280 as the example, the saturation in the drum handling system would be approximately 9.1 mg/m^3. At this concentration the estimated annual amine emissions from the process were calculated as detailed in Table 1.

[1] Available online via: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit (accessed July 2024).

Table 1: Estimated Amine Emissions from A15

Baxxodur 280 Concentration (mg/m³)	Number of Baxxodur 280 Drums Assumed for Calculation [a]	Average Time Drum is Open (hours)	Ventilation Air Flow Rate (m³/h)	Air Changes (per hour)	Amine Emissions (kg/year)
9.1 [b]	150	3	35	10	0.14
		12			0.57
		24			1.15
		3	155	44	0.64
		12			2.54
		24			5.08
		3	540	154	2.21
		12			8.85
		24			17.69

Notes to Table 1
(a) The Baxxodur 280 drums are ~205 litres.
(b) Based on a vapour pressure of 0.0011 hPa at 25°C.

1.1.8. For the purpose of the H1 assessment, the worst-case amine emission rate was used for A15 (i.e., 17.69 kg/year or approximately 0.000561 g/s).

1.2. Summary of Results

1.2.1. It can be seen from the results presented in the H1 calculation (see Appendix II) sheet that the long-term predicted process contributions ("PCs") are less than 1% of the relevant Air Quality Standard ("AQS") or EAL and the short-term predicted PCs are less than 10% of the relevant AQS or EAL. Consequently, as the impact of the predicted PCs can be considered insignificant, no further assessment is therefore required.

APPENDIX I
SAFETY DATA SHEET

We create chemistry

Safety data sheet

BASF Safety data sheet according to Regulation UK SI 2019/758 and UK SI 2020/1577 as amended from time to time.
Date / Revised: 15.12.2022 Version: 11.0
Date previous version: 29.03.2022 Previous version: 10.0
Date / First version: 08.08.2002
Product: **Baxxodur® EC 280**

(ID no. 30340659/SDS_GEN_GB/EN)
Date of print 26.02.2024

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

1.1. Product identifier

Baxxodur® EC 280

Chemical name: 3,3'-(butane-1,4-diylbis(oxy))bispropaneamine
CAS Number: 7300-34-7

REACH registration number: 01-2119978237-25-0000

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

Relevant identified uses: Chemical used in synthesis and/or formulation of industrial products

For the detailed identified uses of the product see appendix of the safety data sheet.

1.3. Details of the supplier of the safety data sheet

Company:
BASF plc
4th and 5th Floors
2 Stockport Exchange
Railway Road, Stockport, SK1 3GG
UNITED KINGDOM

Telephone: +44 161 475 3000
E-mail address: product-safety-uk-and-ireland@basf.com

1.4. Emergency telephone number

Telephone: +49 180 2273-112

SECTION 2: Hazards Identification

2.1. Classification of the substance or mixture

According to GB-CLP Regulations UK SI 2019/720 and UK SI 2020/1567

Acute Tox. 4 (Inhalation - mist)	H332 Harmful if inhaled.
Skin Corr./Irrit. 1B	H314 Causes severe skin burns and eye damage.
Eye Dam./Irrit. 1	H318 Causes serious eye damage.
Skin Sens. 1	H317 May cause an allergic skin reaction.

For the classifications not written out in full in this section the full text can be found in section 16.

2.2. Label elements

According to GB-CLP Regulations UK SI 2019/720 and UK SI 2020/1567

Pictogram:

Signal Word:
Danger

Hazard Statement:

H332	Harmful if inhaled.
H317	May cause an allergic skin reaction.
H314	Causes severe skin burns and eye damage.

Precautionary Statements (Prevention):

P280	Wear protective gloves, protective clothing and eye protection or face protection.
P271	Use only outdoors or in a well-ventilated area.

Precautionary Statements (Response):

P310	Immediately call a POISON CENTER or physician.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Precautionary Statements (Storage):

P405	Store locked up.

Precautionary Statements (Disposal):

P501	Dispose of contents and container to hazardous or special waste collection point.

Hazard determining component(s) for labelling: 3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine

2.3. Other hazards

According to GB-CLP Regulations UK SI 2019/720 and UK SI 2020/1567

If applicable information is provided in this section on other hazards which do not result in classification but which may contribute to the overall hazards of the substance or mixture.

Product does not contain a substance above legal limits included in the list established in accordance with Article 59(1) of Regulation (EC) No 1907/2006 for having endocrine disrupting properties or is identified to have endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.

SECTION 3: Composition/Information on Ingredients

3.1. Substances

Chemical nature

ether amines

Hazardous ingredients (GHS)

3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine

Content (W/W): >= 98.5 % - <= 99.8 %	Acute Tox. 4 (Inhalation - mist)
CAS Number: 7300-34-7	Skin Corr./Irrit. 1B
EC-Number: 230-745-9	Eye Dam./Irrit. 1
	Skin Sens. 1
	H332, H317, H314

For the classifications not written out in full in this section, including the hazard classes and the hazard statements, the full text is listed in section 16.

3.2. Mixtures

Not applicable

SECTION 4: First-Aid Measures

4.1. Description of first aid measures

Immediately remove contaminated clothing. If the patient is likely to become unconscious, place and transport in stable sideways position (recovery position). If not breathing, give artificial respiration. First aid personnel should pay attention to their own safety.

If inhaled:
Keep patient calm, remove to fresh air, seek medical attention. Immediately administer a corticosteroid from a controlled/metered dose inhaler.

On skin contact:
Immediately wash thoroughly with plenty of water, apply sterile dressings, consult a skin specialist.

On contact with eyes:
Immediately wash affected eyes for at least 15 minutes under running water with eyelids held open, consult an eye specialist.

On ingestion:
Do not induce vomiting. Immediately rinse mouth and then drink 200-300 ml of water, seek medical attention.

4.2. Most important symptoms and effects, both acute and delayed
Symptoms: Information, i.e. additional information on symptoms and effects may be included in the GHS labeling phrases available in Section 2 and in the Toxicological assessments available in Section 11., Further symptoms are possible

4.3. Indication of any immediate medical attention and special treatment needed
Treatment: Treat according to symptoms (decontamination, vital functions), no known specific antidote. Pulmonary odema prophylaxis. Medical monitoring for at least 24 hours.

SECTION 5: Fire-Fighting Measures

5.1. Extinguishing media
Suitable extinguishing media:
water spray, dry powder, foam, carbon dioxide

5.2. Special hazards arising from the substance or mixture
Endangering substances: nitrogen oxides, carbon oxides
Advice: The substances/groups of substances mentioned can be released in case of fire. Under certain conditions in case of fire other hazardous combustion products may be generated.

5.3. Advice for fire-fighters
Special protective equipment:
Wear self-contained breathing apparatus and chemical-protective clothing.

Further information:
Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.

SECTION 6: Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures
Use personal protective clothing. Information regarding personal protective measures, see section 8. Avoid inhalation. Avoid contact with the skin, eyes and clothing.

6.2. Environmental precautions
Do not discharge into drains/surface waters/groundwater.

6.3. Methods and material for containment and cleaning up
For small amounts: Pick up with suitable appliance and dispose of.
For large amounts: Pick up with suitable appliance and dispose of.
Cleaning operations should be carried out only while wearing breathing apparatus. Wear suitable protective equipment. Clean contaminated floors and objects thoroughly with water and detergents, observing environmental regulations. Collect waste in suitable containers, which can be labeled and sealed. Incinerate or take to a special waste disposal site in accordance with local authority regulations.

6.4. Reference to other sections
Information regarding exposure controls/personal protection and disposal considerations can be found in section 8 and 13.

SECTION 7: Handling and Storage

7.1. Precautions for safe handling
Ensure thorough ventilation of stores and work areas. Avoid aerosol formation. Handle in accordance with good industrial hygiene and safety practice.

Protection against fire and explosion:
Prevent electrostatic charge - sources of ignition should be kept well clear - fire extinguishers should be kept handy.

7.2. Conditions for safe storage, including any incompatibilities
Segregate from acids and acid forming substances.

Suitable materials for containers: Carbon steel (Iron), Stainless steel 1.4401, Stainless steel 1.4301 (V2), High density polyethylene (HDPE), glass, Low density polyethylene (LDPE)
Unsuitable materials for containers: Galvanized carbon steel (Zinc), Paper/Fibreboard
Further information on storage conditions: Keep container tightly closed and in a well-ventilated place.

Storage stability:
Storage duration: 24 Months
From the data on storage duration in this safety data sheet no agreed statement regarding the warrantee of application properties can be deduced.

7.3. Specific end use(s)
See exposure scenario(s) in the attachment to this safety data sheet.

SECTION 8: Exposure Controls/Personal Protection

8.1. Control parameters

Components with occupational exposure limits

No substance specific occupational exposure limits known.

PNEC
freshwater: 0.22 mg/l

marine water: 0.022 mg/l

intermittent release: 2.2 mg/l

sediment (freshwater): 1.45 mg/kg

sediment (marine water): 0.145 mg/kg

soil: 0.161 mg/kg

STP: 65.3 mg/l

oral (secondary poisoning):
No PNEC oral derived, as accumulation in organisms is not to be expected.

DNEL
worker:
Long-term exposure- systemic effects, Inhalation: 59 mg/m3

worker:
Short-term exposure - systemic effects, Inhalation: 176 mg/m3

worker:
Long-term exposure - local effects, Inhalation: 1 mg/m3

worker:
Short-term exposure - local effects, Inhalation: 13 mg/m3

worker:
Long-term exposure- systemic effects, dermal: 8.3 mg/kg

8.2. Exposure controls

Personal protective equipment

Respiratory protection:
Respiratory protection in case of vapour/aerosol release. Combination filter for gases/vapours of organic compounds and solid and liquid particles (f.e. EN 14387 Type A-P2)

Consider the risk management measures as outlined in the exposure scenario.

Hand protection:
Chemical resistant protective gloves (EN ISO 374-1)

Suitable materials also with prolonged, direct contact (Recommended: Protective index 6, corresponding > 480 minutes of permeation time according to EN ISO 374-1):
butyl rubber (butyl) - 0.7 mm coating thickness
Manufacturer's directions for use should be observed because of great diversity of types.

Supplementary note: The specifications are based on tests, literature data and information of glove manufacturers or are derived from similar substances by analogy. Due to many conditions (e.g. temperature) it must be considered, that the practical usage of a chemical-protective glove in practice may be much shorter than the permeation time determined through testing.

Consider the risk management measures as outlined in the exposure scenario.

Eye protection:
Tightly fitting safety goggles (cage goggles) (e.g. EN 166) and face shield.

Consider the risk management measures as outlined in the exposure scenario.

Body protection:
chemical-protection suit (f.e. according to EN 14605)

Consider the risk management measures as outlined in the exposure scenario.

General safety and hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wearing of closed work clothing is required additionally to the stated personal protection equipment. Avoid contact with the skin, eyes and clothing. Do not breathe vapour/spray. Take off immediately all contaminated clothing. Store work clothing separately. Hands and/or face should be washed before breaks and at the end of the shift. No eating, drinking, smoking or tobacco use at the place of work. Gloves must be inspected regularly and prior to each use. Replace if necessary (e.g. pinhole leaks).

SECTION 9: Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Form:	liquid	
Colour:	colourless to yellow	
Odour:	amine-like	
Odour threshold:	Not determined since harmful by inhalation.	
pH value:	10 (100 g/l, 20 °C)	
Melting point:	3 °C	(OECD Guideline 102)
Boiling point:	298 °C The substance / product decomposes.	
Flash point:	157.5 °C	(ISO 2719)

Evaporation rate:		
	Value can be approximated from Henry's Law Constant or vapor pressure.	
Flammability:	hardly combustible	(derived from flash point)
Lower explosion limit:		
	For liquids not relevant for classification and labelling., The lower explosion point may be 5 - 15 °C below the flash point.	
Upper explosion limit:		
	For liquids not relevant for classification and labelling.	
Ignition temperature:	274 °C	(DIN EN 14522)
Vapour pressure:	0.0011 hPa (25 °C)	(OECD Guideline 104)
	0.011 hPa (50 °C)	(Directive 84/449/EEC, A.4)
Density:	0.956 g/cm3 (20 °C)	
Relative density:	0.9556 (20 °C, 1,013 hPa)	(OECD Guideline 109)
Relative vapour density (air):> 1	(20 °C) Heavier than air.	(estimated)
Solubility in water:	miscible (23 °C)	(OECD Guideline 105)
Partitioning coefficient n-octanol/water (log Kow):	-0.4 (25 °C; pH value: 11.2)	(OECD Guideline 107)
Self ignition:	not self-igniting	Test type: Spontaneous self-ignition at room-temperature.
Thermal decomposition:	350 °C, > 380 kJ/kg, (DSC (OECD 113)) Thermal decomposition above the indicated temperature is possible.	
Viscosity, dynamic:	11.2 mPa.s (20 °C)	(calculated (from kinematic viscosity))
	5.61 mPa.s (40 °C)	(calculated (from kinematic viscosity))
Viscosity, kinematic:	11.7 mm2/s (20 °C)	(OECD 114)
	5.98 mm2/s (40 °C)	(OECD 114)
Explosion hazard:	Based on the chemical structure there is no indication of explosive properties.	
Fire promoting properties:	Based on its structural properties the product is not classified as oxidizing.	

9.2. Other information

Self heating ability:	not applicable, the product is a liquid	
SADT:	Not a substance liable to self-decomposition according to UN transport regulations, class 4.1.	
pKA:	10.3 (20 °C)	(OECD Guideline 112)
Adsorption/water - soil:	KOC: 30; log KOC: 1.48 Adsorption to solid soil phase is not expected. The data refer to the charged form of the substance.	(calculated)
Surface tension:	Based on chemical structure, surface activity is not to be expected.	
Grain size distribution:	The substance / product is marketed or used in a non solid or granular form.	
Molar mass:	204.31 g/mol	

SECTION 10: Stability and Reactivity

10.1. Reactivity
No hazardous reactions if stored and handled as prescribed/indicated.

Corrosion to metals:	Corrosive effects to metal are not anticipated.	
Formation of flammable gases:	Remarks:	Forms no flammable gases in the presence of water.

10.2. Chemical stability
The product is stable if stored and handled as prescribed/indicated.

10.3. Possibility of hazardous reactions
Strong exothermic reaction with acids.

10.4. Conditions to avoid
Avoid all sources of ignition: heat, sparks, open flame.

10.5. Incompatible materials

Substances to avoid:
Copper, strong acids, oxidizing agents, brass, metal alloys, copper alloys

10.6. Hazardous decomposition products

Possible thermal decomposition products:
At prolonged and/or strong thermal stressing above the decomposition temperature dangerous decomposition products can be formed., Incomplete combustion results in formation of toxic gases, containing mainly carbon monoxide and carbon dioxide.

SECTION 11: Toxicological Information

11.1. Information on toxicological effects

Acute toxicity

Assessment of acute toxicity:
Of moderate toxicity after short-term inhalation. Of low toxicity after single ingestion. Of low toxicity after short-term skin contact.

Experimental/calculated data:
LD50 rat (oral): approx. 3,450 mg/kg (similar to OECD guideline 401)

LC50 rat (by inhalation): 1.5 mg/l 4 h (similar to OECD guideline 403)
An aerosol was tested.

LD50 rat (dermal): > 1,000 mg/kg (OECD Guideline 402)
Due to the corrosive properties of the substance higher doses cannot be tested.

Irritation

Assessment of irritating effects:
Corrosive! Damages skin and eyes.

Experimental/calculated data:
Skin corrosion/irritation
rabbit: Corrosive. (similar to OECD guideline 404)

Serious eye damage/irritation
rabbit: irreversible damage (similar to OECD guideline 405)

Respiratory/Skin sensitization

Assessment of sensitization:
As the substance is corrosive, conducting sensitization studies is not feasible. The chemical structure suggests a sensitizing effect.

Experimental/calculated data:
in silico: skin sensitizing ((Q)SAR Model)
The product has not been tested. The statement has been derived from the structure of the product.

Germ cell mutagenicity

Assessment of mutagenicity:
The substance was not mutagenic in bacteria. The substance was not mutagenic in mammalian cell culture. The product has not been fully tested. The statements have been derived in parts from products of a similar structure or composition.

Carcinogenicity

Assessment of carcinogenicity:
No data available concerning carcinogenic effects. The whole of the information assessable provides no indication of a carcinogenic effect.

Reproductive toxicity

Assessment of reproduction toxicity:
The results of animal studies gave no indication of a fertility impairing effect. The results were determined in a Screening test (OECD 421/422). The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Developmental toxicity

Assessment of teratogenicity:
No indications of a developmental toxic / teratogenic effect were seen in animal studies. The results were determined in a Screening test (OECD 421/422). The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Specific target organ toxicity (single exposure)

Assessment of STOT single:
Based on the available information there is no specific target organ toxicity to be expected after a single exposure.

Repeated dose toxicity and Specific target organ toxicity (repeated exposure)

Assessment of repeated dose toxicity:
After repeated exposure the prominent effect is local irritation. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Aspiration hazard

not applicable

SECTION 12: Ecological Information

12.1. Toxicity

Assessment of aquatic toxicity:
There is a high probability that the product is not acutely harmful to aquatic organisms. The inhibition of the degradation activity of activated sludge is not anticipated when introduced to biological treatment plants in appropriate low concentrations.

Toxicity to fish:
LC50 (96 h) > 464 mg/l, Leuciscus idus (DIN 38412 Part 15, static)
Nominal concentration. The product will cause changes in the pH value of the test system. The result refers to a neutralized sample.

Aquatic invertebrates:
EC50 (48 h) 218.16 mg/l, Daphnia magna (Directive 92/69/EEC, C.2, static)
Nominal concentration. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Aquatic plants:
EC50 (72 h) > 500 mg/l (growth rate), Desmodesmus subspicatus (DIN 38412 Part 9, static)
Nominal concentration. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EC10 (72 h) 31.3 mg/l (growth rate), Desmodesmus subspicatus (DIN 38412 Part 9, static)
Nominal concentration. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Microorganisms/Effect on activated sludge:
EC50 (17 h) 136 mg/l, Pseudomonas putida (DIN 38412 Part 8)
Nominal concentration. After neutralization no appreciable reduction in harmful effect can be observed.

Chronic toxicity to fish:
No data available.

Chronic toxicity to aquatic invertebrates:
No data available.

Assessment of terrestrial toxicity:
No data available.

12.2. Persistence and degradability

Assessment biodegradation and elimination (H2O):
Not readily biodegradable (by OECD criteria). The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Elimination information:
0 % CO2 formation relative to the theoretical value (60 d) (OECD 301B; ISO 9439; 92/69/EEC, C.4-C) (aerobic, activated sludge, domestic, non-adapted)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Assessment of stability in water:
According to structural properties, hydrolysis is not expected/probable.
Information on Stability in Water (Hydrolysis):
According to structural properties, hydrolysis is not expected/probable.

12.3. Bioaccumulative potential

Assessment bioaccumulation potential:

Because of the n-octanol/water distribution coefficient (log Pow) accumulation in organisms is not to be expected.

12.4. Mobility in soil

Assessment transport between environmental compartments:
Volatility: The substance will not evaporate into the atmosphere from the water surface. The data refer to the charged form of the substance.
Adsorption in soil: Adsorption to solid soil phase is not expected. The product has not been tested. The statement has been derived from the structure of the product. The data refer to the charged form of the substance.

12.5. Results of PBT and vPvB assessment

According to Annex XIII of Regulation (EC) No.1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH): The product does not fulfill the criteria for PBT (Persistent/bioaccumulative/toxic) and vPvB (very persistent/very bioaccumulative). Self classification

12.6. Other adverse effects

The substance is not listed in Regulation (EC) 1005/2009 on substances that deplete the ozone layer.

12.7. Additional information

Sum parameter

Chemical oxygen demand (COD): 1,690 mg/l

Biochemical oxygen demand (BOD) Incubation period 5 d: 115 mg/l

Adsorbable organically-bound halogen (AOX):
This product contains no organically-bound halogen.

Other ecotoxicological advice:
Due to the pH-value of the product, neutralization is generally required before discharging sewage into treatment plants.

SECTION 13: Disposal Considerations

13.1. Waste treatment methods

Incinerate in suitable incineration plant, observing local authority regulations.

A waste code in accordance with the European waste catalog (EWC) cannot be specified, due to dependence on the usage.

The waste code in accordance with the European waste catalog (EWC) must be specified in cooperation with disposal agency/manufacturer/authorities.

The UK Environmental Protection (Duty of Care) Regulations (EP) and amendments should be noted (United Kingdom).
This product and any uncleaned containers must be disposed of as hazardous waste in accordance with the 2005 Hazardous Waste Regulations and amendments (United Kingdom)

Contaminated packaging:
Contaminated packaging should be emptied as far as possible; then it can be passed on for recycling after being thoroughly cleaned.

SECTION 14: Transport Information

Land transport

ADR

UN number or ID number:	UN2735
UN proper shipping name:	AMINES, LIQUID, CORROSIVE, N.O.S. (contains 4,9-DIOXADODECANE-1,12-DIAMINE)
Transport hazard class(es):	8
Packing group:	II
Environmental hazards:	no
Special precautions for user:	Tunnel code: E

RID

UN number or ID number:	UN2735
UN proper shipping name:	AMINES, LIQUID, CORROSIVE, N.O.S. (contains 4,9-DIOXADODECANE-1,12-DIAMINE)
Transport hazard class(es):	8
Packing group:	II
Environmental hazards:	no
Special precautions for user:	None known

Inland waterway transport

ADN

UN number or ID number:	UN2735
UN proper shipping name:	AMINES, LIQUID, CORROSIVE, N.O.S. (contains 4,9-DIOXADODECANE-1,12-DIAMINE)
Transport hazard class(es):	8
Packing group:	II
Environmental hazards:	no

Special precautions for user:	None known

Transport in inland waterway vessel
Not evaluated

Sea transport

IMDG

UN number or ID number:	UN 2735
UN proper shipping name:	AMINES, LIQUID, CORROSIVE, N.O.S. (contains 4,9-DIOXADODECANE-1,12-DIAMINE)
Transport hazard class(es):	8
Packing group:	II
Environmental hazards:	no Marine pollutant: NO
Special precautions for user:	

Air transport

IATA/ICAO

UN number or ID number:	UN 2735
UN proper shipping name:	AMINES, LIQUID, CORROSIVE, N.O.S. (contains 4,9-DIOXADODECANE-1,12-DIAMINE)
Transport hazard class(es):	8
Packing group:	II
Environmental hazards:	No Mark as dangerous for the environment is needed
Special precautions for user:	None known

14.1. UN number or ID number
See corresponding entries for “UN number or ID number” for the respective regulations in the tables above.

14.2. UN proper shipping name
See corresponding entries for “UN proper shipping name” for the respective regulations in the tables above.

14.3. Transport hazard class(es)
See corresponding entries for “Transport hazard class(es)” for the respective regulations in the tables above.

14.4. Packing group
See corresponding entries for “Packing group” for the respective regulations in the tables above.

14.5. Environmental hazards
See corresponding entries for “Environmental hazards” for the respective regulations in the tables above.

14.6. Special precautions for user
See corresponding entries for “Special precautions for user” for the respective regulations in the tables above.

14.7. Maritime transport in bulk according to IMO instruments

Maritime transport in bulk is not intended.

Further information
This product is subject to the most recent edition of "The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations" and their amendments (United Kingdom).

SECTION 15: Regulatory Information

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

Prohibitions, Restrictions and Authorizations

Annex XVII of Regulation (EC) No 1907/2006: Number on List: 3

Directive 2012/18/EU - Control of Major Accident Hazards involving dangerous substances (EU): Listed in above regulation: no

If other regulatory information applies that is not already provided elsewhere in this safety data sheet, then it is described in this subsection.

The data should be considered when making any assessment under the Control of Substances Hazardous to Health Regulations (COSHH), and related guidance, for example, 'COSHH Essentials' (United Kingdom).

15.2. Chemical Safety Assessment

Chemical Safety Assessment performed

SECTION 16: Other Information

Assessment of the hazard classes according to UN GHS criteria (most recent version)

Acute Tox. 5 (oral)
Acute Tox. 5 (dermal)
Acute Tox. 4 (Inhalation - mist)
Skin Corr./Irrit. 1B
Skin Sens. 1
Eye Dam./Irrit. 1

Any other intended applications should be discussed with the manufacturer. Corresponding occupational protection measurements must be followed.

Full text of the classifications, including the hazard classes and the hazard statements, if mentioned in section 2 or 3:

Acute Tox.	Acute toxicity
Skin Corr./Irrit.	Skin corrosion/irritation
Eye Dam./Irrit.	Serious eye damage/eye irritation
Skin Sens.	Skin sensitization
H332	Harmful if inhaled.
H317	May cause an allergic skin reaction.
H314	Causes severe skin burns and eye damage.

Abbreviations
ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road. ADN = The European Agreement concerning the International Carriage of Dangerous Goods by Inland waterways. ATE = Acute Toxicity Estimates. CAO = Cargo Aircraft Only. CAS = Chemical Abstract Service. CLP = Classification, Labelling and Packaging of substances and mixtures. DIN = German national organization for standardization. DNEL = Derived No Effect Level. EC50 = Effective concentration median for 50% of the population. EC = European Community. EN = European Standards. IARC = International Agency for Research on Cancer. IATA = International Air Transport Association. IBC-Code = Intermediate Bulk Container code. IMDG = International Maritime Dangerous Goods Code. ISO = International Organization for Standardization. STEL = Short-Term Exposure Limit. LC50 = Lethal concentration median for 50% of the population. LD50 = Lethal dose median for 50% of the population. TLV = Threshold Limit Value. MARPOL = The International Convention for the Prevention of Pollution from Ships. NEN = Dutch Norm. NOEC = No Observed Effect Concentration. OEL = Occupational Exposure Limit. OECD = Organization for Economic Cooperation and Development. PBT = Persistent, Bioaccumulative and Toxic. PNEC = Predicted No Effect Level. PPM = Parts per million. RID = The European Agreement concerning the International Carriage of Dangerous Goods by Rail. TWA = Time Weight Average. UN-number = UN number at transport. vPvB = very Persistent and very Bioaccumulative.

The data contained in this safety data sheet are based on our current knowledge and experience and describe the product only with regard to safety requirements. This safety data sheet is neither a Certificate of Analysis (CoA) nor technical data sheet and shall not be mistaken for a specification agreement. Identified uses in this safety data sheet do neither represent an agreement on the corresponding contractual quality of the substance/mixture nor a contractually designated use. It is the responsibility of the recipient of the product to ensure any proprietary rights and existing laws and legislation are observed.

Annex: Exposure Scenarios

Index

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1. Short title of exposure scenario

Charging and discharging of substances and mixtures
SU3; ERC2; PROC8a, PROC8b, PROC9

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC2: Formulation into mixture
Operational conditions	
Annual amount used in the EU	120,000 kg
Minimum emission days per year	100

Emission factor air	0.001 %
Emission factor water	0.001 %
Emission factor soil	0 %
Receive Surf. Water (Flow Rate).	18,000 m3/d
Dilution factor river	10
Dilution factor coast	100

Risk Management Measures	
Air treatment measures considered suitable are, e.g.	Exhaust air scrubber, Waste gas treatment by thermal oxidation
Wastewater treatment measures considered suitable are, e.g.	Aerobic biological treatment
Soil treatment measures considered suitable are, e.g.	No application of sludge to soil, Sealing of all relevant soil surfaces, Sewage Sludge incineration
	No application of sludge to soil
Type of STP	Municipal STP
Assumed sewage treatment plant flow (m3/d)	2,000 m3/d

Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Environment
Risk Characterization Ratio (RCR)	0.003698
	Risk from environmental exposure is driven by marine water.
Maximum amount of safe use	324,516.4 kg/d
Risk from environmental exposure is driven by marine water.	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.

Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.6857 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.082616
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C

Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Outdoor
Risk Management Measures	
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.6857 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.082616
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version
	Worker - inhalation, long-term - local
Exposure estimate	0.5959 mg/m³
Risk Characterization Ratio (RCR)	0.595904
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week

Indoor/Outdoor	Outdoor
Risk Management Measures	
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0214 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.002582
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.9311 mg/m³
Risk Characterization Ratio (RCR)	0.931099
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C

Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.6857 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.082616
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version
	Worker - inhalation, long-term - local
Exposure estimate	0.0001 mg/m³
Risk Characterization Ratio (RCR)	0.000001
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week

Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 95 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.6857 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.082616
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.2763 mg/m³
Risk Characterization Ratio (RCR)	0.276259
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week

Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Use suitable chemically resistant gloves.	Effectiveness: 80 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	1.3714 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.165232
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version
	Worker - inhalation, long-term - local
Exposure estimate	0.0001 mg/m³
Risk Characterization Ratio (RCR)	0.000001
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor

	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.3429 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.041308
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week

Indoor/Outdoor	Outdoor
Risk Management Measures	
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.3429 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.041308
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version
	Worker - inhalation, long-term - local
Exposure estimate	0.5959 mg/m³
Risk Characterization Ratio (RCR)	0.595904
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

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2. Short title of exposure scenario

Charging and discharging of substances and mixtures
SU22; ERC8a; PROC8a, PROC8b, PROC9

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC8a: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	

Contributing exposure scenario

Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	10 min 5 days per week
Indoor/Outdoor	Outdoor
Risk Management Measures	
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0286 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.003442
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.3104 mg/m³
Risk Characterization Ratio (RCR)	0.310366
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

Contributing exposure scenario	
Use descriptors covered	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	10 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 80 %
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0286 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.003442
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.8868 mg/m³
Risk Characterization Ratio (RCR)	0.886761
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see	

exposure estimates)

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	15 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	1.3714 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.165232
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5959 mg/m³
Risk Characterization Ratio (RCR)	0.595904
Guidance to Downstream Users	

For scaling see: http://www.ecetoc.org/tra

Contributing exposure scenario	
Use descriptors covered	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	30 min 5 days per week
Indoor/Outdoor	Outdoor
Risk Management Measures	
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0857 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.010327
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.3724 mg/m³
Risk Characterization Ratio (RCR)	0.37244
Guidance to Downstream Users	

For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	30 min 5 days per week
Indoor/Outdoor	Outdoor
Risk Management Measures	
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0429 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.005164
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.3724 mg/m³
Risk Characterization Ratio (RCR)	0.37244

Guidance to Downstream Users
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)

Contributing exposure scenario	
Use descriptors covered	PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	10 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 80 %
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0143 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.001721
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local

Exposure estimate	0.3547 mg/m³
Risk Characterization Ratio (RCR)	0.354705
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

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3. Short title of exposure scenario

Formulation
SU3; ERC2; PROC1, PROC2, PROC3, PROC4, PROC5

Control of exposure and risk management measures

Contributing exposure scenario		
Use descriptors covered	ERC2: Formulation into mixture	
Operational conditions		
Annual amount used in the EU	5,000 kg	
Minimum emission days per year	10	
Emission factor air	0.25 %	
Emission factor water	0.5 %	
Emission factor soil	0.01 %	
Receive Surf. Water (Flow Rate).	18,000 m3/d	
Dilution factor river	10	
Dilution factor coast	100	
Risk Management Measures		
Air treatment measures considered suitable are, e.g.		Exhaust air scrubber, Waste gas treatment by thermal oxidation
Wastewater treatment measures considered suitable are, e.g.		Aerobic biological treatment
Soil treatment measures considered suitable are, e.g.		No application of sludge to soil, Sealing of all relevant soil surfaces, Sewage Sludge incineration
		No application of sludge to soil
Type of STP		Municipal STP
Assumed sewage treatment plant flow (m3/d)		2,000 m3/d
Exposure estimate and reference to its source		
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Environment	
Risk Characterization Ratio (RCR)	0.569111	

	Risk from environmental exposure is driven by marine water.
Maximum amount of safe use	878.6 kg/d
Risk from environmental exposure is driven by marine water.	

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0017 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.000207
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.0851 mg/m³

Risk Characterization Ratio (RCR)	0.085129
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0686 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.008262
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.8513 mg/m³
Risk Characterization Ratio (RCR)	0.851291
Guidance to Downstream Users	

For scaling see: http://www.ecetoc.org/tra

Contributing exposure scenario	
Use descriptors covered	PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0206 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.002478
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local

Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC4: Chemical production where opportunity for exposure arises Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.2057 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.024785
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker

	Worker - inhalation, long-term - local
Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 5 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.1371 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.016523
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5108 mg/m³
Risk Characterization Ratio (RCR)	0.510774
Guidance to Downstream Users	

For scaling see: http://www.ecetoc.org/tra

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.4114 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.04957
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	

For scaling see: http://www.ecetoc.org/tra

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4. Short title of exposure scenario

Formulation
SU22; ERC8a, ERC8c, ERC8f; PROC1, PROC2, PROC3, PROC4, PROC5

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC8a: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	

Contributing exposure scenario	
Use descriptors covered	ERC8c: Widespread use leading to inclusion into/onto article (indoor) As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	

Contributing exposure scenario	
Use descriptors covered	ERC8f: Widespread use leading to inclusion into/onto article (outdoor) As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance	0.067 Pa

during use	
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0034 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.000413
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.0851 mg/m³
Risk Characterization Ratio (RCR)	0.085129
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C

Duration and Frequency of activity	30 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 80 %
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0086 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.001033
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.3724 mg/m³
Risk Characterization Ratio (RCR)	0.37244
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

Contributing exposure scenario	
Use descriptors covered	PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine

	Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	120 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 80 %
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0171 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.002065
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.8939 mg/m³
Risk Characterization Ratio (RCR)	0.893855
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

Contributing exposure scenario	
Use descriptors covered	PROC4: Chemical production where opportunity for

	exposure arises Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	30 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 80 %
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0429 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.005164
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.7449 mg/m³
Risk Characterization Ratio (RCR)	0.744879
Guidance to Downstream Users	

For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 5 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 80 %
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.2743 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.033046
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.4767 mg/m³
Risk Characterization Ratio (RCR)	0.476723
Guidance to Downstream Users	

For scaling see: http://www.ecetoc.org/tra

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	10 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 80 %
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0286 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.003442
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local

Exposure estimate	0.2483 mg/m³
Risk Characterization Ratio (RCR)	0.248293
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

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5. Short title of exposure scenario

Use in laboratories
SU3; ERC4; PROC15

Control of exposure and risk management measures

Contributing exposure scenario		
Use descriptors covered	ERC4: Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	
Operational conditions		
Annual amount used in the EU	100 kg	
Minimum emission days per year	20	
Emission factor air	2.5 %	
Emission factor water	2 %	
Emission factor soil	0 %	
Receive Surf. Water (Flow Rate).	18,000 m3/d	
Dilution factor river	10	
Dilution factor coast	100	
Risk Management Measures		
Air treatment measures considered suitable are, e.g.		Waste gas treatment by thermal oxidation, Exhaust air scrubber
Wastewater treatment measures considered suitable are, e.g.		Aerobic biological treatment
Soil treatment measures considered suitable are, e.g.		Sewage Sludge incineration, No application of sludge to soil, Sealing of all relevant soil surfaces
		No application of sludge to soil
Type of STP		Municipal STP
Assumed sewage treatment plant flow (m3/d)		2,000 m3/d
Exposure estimate and reference to its source		
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Environment	

Risk Characterization Ratio (RCR)	0.023696
	Risk from environmental exposure is driven by marine water.
Maximum amount of safe use	211 kg/d
Risk from environmental exposure is driven by marine water.	

Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0171 mg/kg bw/day

Risk Characterization Ratio (RCR)	0.002065
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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6. Short title of exposure scenario

Use in laboratories
SU22; ERC8a; PROC15

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC8a: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	

Contributing exposure scenario	
Use descriptors covered	PROC15: Use a laboratory reagent. Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	30 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 80 %
Wear chemically resistant gloves in combination with ‘basic’ employee training.	Effectiveness: 90 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are	

being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0021 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.000258
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.5321 mg/m³
Risk Characterization Ratio (RCR)	0.532057
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

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7. Short title of exposure scenario

Use as a Process chemical
SU3; ERC4; PROC1, PROC2, PROC3, PROC4

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC4: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: industrial

Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0017 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.000207
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.0851 mg/m³
Risk Characterization Ratio (RCR)	0.085129
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %

Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0686 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.008262
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.8513 mg/m³
Risk Characterization Ratio (RCR)	0.851291
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %

Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0343 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.004131
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.7662 mg/m³
Risk Characterization Ratio (RCR)	0.766162
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC4: Chemical production where opportunity for exposure arises Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %

Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour)	Effectiveness: 70 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.3429 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.041308
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.7662 mg/m³
Risk Characterization Ratio (RCR)	0.766162
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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8. Short title of exposure scenario

Use as an intermediate
SU3; ERC6a; PROC1, PROC2, PROC3

Control of exposure and risk management measures

Contributing exposure scenario

Use descriptors covered	ERC6a: Use of intermediate
Operational conditions	
Annual amount used in the EU	5,000 kg
Minimum emission days per year	20
Emission factor air	0.01 %
Emission factor water	0.046 %
Emission factor soil	0.01 %
Receive Surf. Water (Flow Rate).	18,000 m3/d
Dilution factor river	10
Dilution factor coast	100

Risk Management Measures	
Air treatment measures considered suitable are, e.g.	Exhaust air scrubber, Waste gas treatment by thermal oxidation
Wastewater treatment measures considered suitable are, e.g.	Aerobic biological treatment
Soil treatment measures considered suitable are, e.g.	No application of sludge to soil, Sealing of all relevant soil surfaces
	No application of sludge to soil
Type of STP	Municipal STP
Assumed sewage treatment plant flow (m3/d)	2,000 m3/d

Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Environment
Risk Characterization Ratio (RCR)	0.027105
	Risk from environmental exposure is driven by marine water.
Maximum amount of safe use	9,223.3 kg/d
Risk from environmental exposure is driven by marine water.	

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %

Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0017 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.000207
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.0596 mg/m³
Risk Characterization Ratio (RCR)	0.05959
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %

Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0686 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.008262
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition Use domain: industrial
Operational conditions	

Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 100 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0343 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.004131
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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9. Short title of exposure scenario

Polymer production, Use as a Process chemical

SU3; ERC6d; PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC10, PROC13

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC6d: Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article) As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Operational conditions	

Contributing exposure scenario	
Use descriptors covered	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions. Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	

Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.001 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.000124
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.0358 mg/m³
Risk Characterization Ratio (RCR)	0.035754
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	

Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0411 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.004957
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.3575 mg/m³
Risk Characterization Ratio (RCR)	0.357542
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working	

clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.0206 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.002478
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC4: Chemical production where opportunity for exposure arises Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant	

gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.2057 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.024785
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant	

gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.4114 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.04957
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 5 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	240 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	

Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.1371 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.016523
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5108 mg/m³
Risk Characterization Ratio (RCR)	0.510774
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC7: Industrial spraying Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
	Large workrooms only
Application rate	< 3 l/min
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 95 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Ensure that the task is not carried out overhead.	
Surface spraying with no or low compressed air use.	
Provide extract ventilation to points where emissions occur (LEV).	
Ensure that general housekeeping is in place	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	
Ensure that the task is being carried	

out outside the breathing zone of a worker (distance head-product greater than 1m).	
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	1.2857 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.154905
Assessment method	EASY TRA v4.2, Advanced REACH Tool v1.5
	Worker - inhalation, long-term - local
Exposure estimate	0.1 mg/m³
Risk Characterization Ratio (RCR)	0.1
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra For scaling see: http://www.advancedreachtool.com	

Contributing exposure scenario	
Use descriptors covered	PROC10: Roller application or brushing Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %

Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.8229 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.099139
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC13: Treatment of articles by dipping and pouring. Use domain: industrial
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 25 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
	Air concentration is limited to the saturated air concentration of the pure compound.
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
	Assumes activities are at ambient temperature.
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with specific activity training	Effectiveness: 95 %

Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - dermal, long-term - systemic
Exposure estimate	0.4114 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.04957
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Worker
	Worker - inhalation, long-term - local
Exposure estimate	0.5525 mg/m³
Risk Characterization Ratio (RCR)	0.552519
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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10. Short title of exposure scenario

Polymer production, Use as a Process chemical
SU22; ERC8c, ERC8f; PROC10, PROC11, PROC13, PROC14, PROC19

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC6d: Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
Operational conditions	
Annual amount used in the EU	5,000 kg
Minimum emission days per year	20
Emission factor air	35 %
Emission factor water	0.005 %

Emission factor soil	0.025 %
Receive Surf. Water (Flow Rate).	18,000 m3/d
Dilution factor river	10
Dilution factor coast	100

Risk Management Measures	
Soil treatment measures considered suitable are, e.g.	No application of sludge to soil
Type of STP	Municipal STP
Assumed sewage treatment plant flow (m3/d)	2,000 m3/d

Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Environment
Risk Characterization Ratio (RCR)	0.005392
	Risk from environmental exposure is driven by soil.
Maximum amount of safe use	46,366.6 kg/d

Risk from environmental exposure is driven by soil.

Contributing exposure scenario	
Use descriptors covered	ERC6d: Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)

Operational conditions	
Annual amount used in the EU	30,000 kg
Minimum emission days per year	20
Emission factor air	35 %
Emission factor water	0.005 %
Emission factor soil	0.025 %
Receive Surf. Water (Flow Rate).	18,000 m3/d
Dilution factor river	10
Dilution factor coast	100

Risk Management Measures	
Soil treatment measures considered suitable are, e.g.	No application of sludge to soil
Type of STP	Municipal STP
Assumed sewage treatment plant flow (m3/d)	2,000 m3/d

Exposure estimate and reference to its source	
Assessment method	EASY TRA v4.2, ECETOC TRA v3.0, Environment

Risk Characterization Ratio (RCR)	0.02847
	Risk from environmental exposure is driven by soil.
Maximum amount of safe use	52,686.6 kg/d
Risk from environmental exposure is driven by soil.	

Contributing exposure scenario	
Use descriptors covered	PROC10: Roller application or brushing Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 5 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 80 %
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0686 mg/kg bw/day

Risk Characterization Ratio (RCR)	0.008262
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.7449 mg/m³
Risk Characterization Ratio (RCR)	0.744879
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

Contributing exposure scenario	
Use descriptors covered	PROC11: Non industrial spraying Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 50 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	480 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: >= 50 %
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90 %
Surface spraying with no or low compressed air use. Ensure that the task is not carried out overhead. Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m). Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	

Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The concentration of the substance has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	5.3571 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.645439
Assessment method	EASY TRA v3.5, Advanced REACH Tool v1.5
	Worker - inhalation, long-term - local
Exposure estimate	0.14 mg/m³
Risk Characterization Ratio (RCR)	0.14
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

Contributing exposure scenario	
Use descriptors covered	PROC13: Treatment of articles by dipping and pouring. Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 5 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	180 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 80 %
Wear chemically resistant gloves in combination with ‘basic’ employee training.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working	

clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.1029 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.012392
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.8939 mg/m³
Risk Characterization Ratio (RCR)	0.893855
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

Contributing exposure scenario	
Use descriptors covered	PROC14: Tabletting, compression, extrusion, pelletisation, granulation Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 5 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	180 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 80 %
Wear chemically resistant gloves in combination with ‘basic’ employee training.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %
Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs	

followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.0257 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.003098
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.8939 mg/m³
Risk Characterization Ratio (RCR)	0.893855
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

Contributing exposure scenario	
Use descriptors covered	PROC19: Manual activities involving hand contact Use domain: professional
Operational conditions	
Concentration of the substance	3,3'-[Butane-1,4-diylbis(oxy)]bispropanamine Content: >= 0 % - <= 5 %
Physical state	liquid
Vapour pressure of the substance during use	0.067 Pa
Process temperature	20 °C
Duration and Frequency of activity	60 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Local exhaust ventilation	Effectiveness: 80 %
Wear chemically resistant gloves in combination with ‘basic’ employee training.	Effectiveness: 90 %
Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)	Effectiveness: 30 %

Avoid frequent and direct contact with substance. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Clean equipment and the work area every day. Ensure minimization of manual phases	
Use suitable chemically resistant gloves., Wear suitable working clothes., Change gloves, if duration of activity exceeds break through time	
Use suitable eye protection.	
Exposure estimate and reference to its source	
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - dermal, long-term - systemic
Exposure estimate	0.3536 mg/kg bw/day
Risk Characterization Ratio (RCR)	0.042599
Assessment method	EASY TRA v3.5, ECETOC TRA v3.0, worker, modified version, The duration of activity has been considered using a linear approach.
	Worker - inhalation, long-term - local
Exposure estimate	0.7449 mg/m³
Risk Characterization Ratio (RCR)	0.744879
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra Please note that a modified version has been used (see exposure estimates)	

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APPENDIX II
H1 CALCULATION SHEET

Abril Industrial Waxes - H1 Assessment of Emissions to Air

Acronyms / Abbreviations	
AQS = Air Quality Standard	LT = Long-term, ST = Short-term
EA = Environment Agency	PC = Process Contribution
EAL = Environmental Assessment Level	PM = Particulate Matter

Calculation of Effective Stack Height					
	A2	A3	A12	A14	A15
H (m):	10.00	10.00	10.00	10.00	3.00
Uact (m):	3	4.5	6	3	5
Ueff* (m):	0.00	0.00	0.00	0.00	0.00

Stage one screening:

Stack	Pollutant	Stack Height	Maximum Release Concentration (mg/m^3) [a]	Volumetric Flow Rate (m^3/s) [a]	Discharge Rate (g/s) [a]	Effective Stack Height (m)	Dispersion Factor ($\mu g/m^3/g/s$) LT	Dispersion Factor ($\mu g/m^3/g/s$) ST	PC [b] ($\mu g/m^3$) LT [c]	PC [b] ($\mu g/m^3$) ST	Total PC [d] ($\mu g/m^3$) LT	Total PC [d] ($\mu g/m^3$) ST	AQS or EAL ($\mu g/m^3$) LT	AQS or EAL ($\mu g/m^3$) ST	PC as % of AQS or EAL LT	PC as % of AQS or EAL ST	PC Significant? [e] (>1%) LT	PC Significant? [e] (>10%) ST
A2	$PM_{2.5}$	3	0.10	1.89	0.000189	0.0	148	3900	0.0280	0.737	0.101	2.67	20	N/A	0.51%	N/A	No	N/A
A3		4.5	0.10	1.39	0.000139	0.0	148	3900	0.0206	0.542								
A12		6	0.10	1.67	0.000167	0.0	148	3900	0.0247	0.650								
A14		3	0.10	1.89	0.000189	0.0	148	3900	0.0280	0.737								
A2	PM_{10}	3	0.10	1.89	0.000189	0.0	148	3900	0.0280	0.435	0.101	1.57	40	50	0.25%	3.14%	No	No
A3		4.5	0.10	1.39	0.000139	0.0	148	3900	0.0206	0.320								
A12		6	0.10	1.67	0.000167	0.0	148	3900	0.0247	0.384								
A14		3	0.10	1.89	0.000189	0.0	148	3900	0.0280	0.435								
A15	New Diamine: 3,3'-(butane-1,4-diylbis(oxy))bispropaneamine) [f]	5	9.10	0.515	0.000561	0.0	148	3900	0.0490	1.29	0.0490	1.29	100	400	0.049%	0.32%	No	No

Notes to H1 Calculation:

The EA's *Air emissions risk assessment for your environmental permit* was the guidance used to carry out the assessment.

* The effective height of release should be treated as 0m when the emission is actually released at a point that is less than 3m above the ground or building on which the stack is located or if it is more than 3m above the ground or building but less than the height of the tallest building within a distance that's 5 times 'L' (L being the lowest of either the building height or the greatest width between two points at the same height of the building).

(a) The estimated emissions data values have been supplied by Abril or their technology providers. For A15, based on a consultation Abri had with the supplier of the New Diamine handling system, the estimated emissions of Baxxodur 280 were calculated as per the table provided in Section 1.1 of the main report. The worst-case emission rate has been utilised for the purpose of the H1 assessment.

(b) Where the environmental standard is measured using a different time period to an hourly average, the PC must be multiplied by the relevant conversion factor (i.e., 0.59 for 24-hour ST PM_{10} and LT New Diamine (assessed as monoethanolamine)).

(c) Annual average figures can be adjusted down to account for the period in which the site is not operating. As a worst-case it has been assumed the site is operating 24 hours a day, 365 days of the year.

(d) When a substance is released from more than one point, you must add up the substance's PC from each source to get the total PC for the substance.

(e) If the LT PC is less than 1% of the LT environmental standard and / or the ST PC is less than 10% of the ST environmental standard, then no further screening or assessment is required.

(f) Refer to the Safety Data Sheet provided as Appendix I of the main report for further details. In the absence of a declared EAL for this substance, the EALs for monoethanolamine have been used instead.