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

1.1. Product identifier

Product form	: Substance
Name	: CYCLOPENTANE
Chemical name	: CYCLOPENTANE
EC Index-No.	: 601-030-00-2
EC-No.	: 206-016-6
CAS-No.	: 287-92-3
REACH registration No	: 01-2119463053-47
Product code	: 100037700
Synonyms	: NOVEXPANS cyclopentane

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

1.2.1. Relevant identified uses

Use of the substance/mixture : Solvent
Blowing agent

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Supplier
Dehon Service SAS
26 Avenue du Petit Parc
94683 VINCENNES Cedex - France
T 01 43 98 75 00 - F 01 43 98 21 51
ContactFDS@climalife.dehon.com

Other
Galco s.a/n.v.
Avenue Carton de Wiart, 79
1090 BRUSSELS - Belgium
T 00 32 2 421 01 84 - F 00 32 2 421 01 84 / 00 32 2 425 38 12
ContactFDS@climalife.dehon.com

Other
Climalife Hongrie Kft
Villányi út 47
1118 Budaörs - Hungary
T (36) 23 431 660 - F (36) 23 431 661
ContactFDS@climalife.dehon.com

Other
Climalife Kft Budepesta sucurcala Bucuresti Romania
Bulevardul Hristo Botev, Nr. 28,
Biroul NR 4, Modulul I
Bucuresti Sectorul 3 - Romania
ContactFDS@climalife.dehon.com

Other
Climalife Supplied by Inventec Performance Chemicals Italia SRL
Via del Lavoro, 10/G
20874 Busnago MB - Italia
T +39 39-5973480 - F +39 39-5973490
ContactFDS@climalife.dehon.com

Other
Dehon Kälte-Fachvertriebs GmbH
Robert-Bosch-Strasse 14
40668 MEERBUSCH - Germany
T 00 49 2150 7073 0 - F 00 49 2150 7073 17
ContactFDS@climalife.dehon.com

Other
Dehon nordic service
Östra Hamngatan 50B 3tr
41109 GÖTEBORG - Sweden
T 00 46 44 21 58 80 - F 00 46 44 21 58 80
ContactFDS@climalife.dehon.com

Other
Dehon Service Belgium s.a/n.v.
Avenue Carton de Wiart, 79
1090 Bruxelles - Belgium
T 00 32 2 421 01 70 - F 00 32 2 426 96 62
ContactFDS@climalife.dehon.com

Other
Dehon Service Nerderland B.V.
Van Konijnenburgweg 84
NL-4612 PL Bergen Op Zoom - Netherlands
T 00 31 164 212 830 - F 00 31 164 212 831
ContactFDS@climalife.dehon.com

Other
Friogas sa
Poligono Industrial SEPES
Parcela 10
46500 SAGUNTO (Valencia) - Spain
T 00 34 9 6 266 36 32 - F 00 34 9 6 266 50 25
ContactFDS@climalife.dehon.com

Other
IDS Refrigeration Limited
22 Apex Court, Woodlands, Bradley Stoke
BS32 4JT Bristol - United Kingdom
T 00 44 1179 802520 - F 00 44 1179 802521
ContactFDS@climalife.dehon.com

Other
Prochimac SA
Rue du Château 10
CH-2000 NEUCHATEL - Switzerland
T 00 41 32 727 36 00 - F 00 41 32 727 36 19
ContactFDS@climalife.dehon.com

1.4. Emergency telephone number

Emergency number : +33 (0) 1 72 11 00 03

Country	Organisation/Company	Address	Emergency number	Comment
United Kingdom	National Poisons Information Service (Birmingham Centre) City Hospital	Dudley Road B18 7QH Birmingham	0344 892 0111	

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Flam. Liq. 2	H225
STOT SE 3	H336
Asp. Tox. 1	H304
Aquatic Chronic 3	H412

Full text of hazard classes and H-statements : see section 16

Adverse physicochemical, human health and environmental effects

Highly flammable liquid and vapour. May be fatal if swallowed and enters airways. May cause drowsiness or dizziness. Harmful to aquatic life with long lasting effects.

2.2. Label elements

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

Hazard pictograms (CLP) :

GHS02 GHS07 GHS08

Signal word (CLP) : Danger

Hazard statements (CLP) : H225 - Highly flammable liquid and vapour.
H304 - May be fatal if swallowed and enters airways.
H336 - May cause drowsiness or dizziness.
H412 - Harmful to aquatic life with long lasting effects.

Precautionary statements (CLP) : P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P261 - Avoid breathing vapours.
P273 - Avoid release to the environment.
P301+P310+P331 - IF SWALLOWED: Immediately call a POISON CENTER, a doctor. Do NOT induce vomiting.
P312 - Call a doctor, a POISON CENTER if you feel unwell.
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P501 - Dispose of contents and container to hazardous or special waste collection point in accordance with national regulation..

EUH-statements : EUH066 - Repeated exposure may cause skin dryness or cracking.

2.3. Other hazards

Other hazards not contributing to the classification : Flammable or explosive vapour/air mixtures may be formed.

This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII

This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
CYCLOPENTANE	(CAS-No.) 287-92-3 (EC-No.) 206-016-6 (EC Index-No.) 601-030-00-2 (REACH-no) 01-2119463053-47	> 95	Flam. Liq. 2, H225 STOT SE 3, H336 Asp. Tox. 1, H304 Aquatic Chronic 3, H412

Full text of H-statements: see section 16

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Move the affected person away from the contaminated area and into the fresh air. Make the person rest. If you feel unwell, seek medical advice.

First-aid measures after skin contact : Wash immediately with plenty of soap and water. Remove all contaminated clothing and footwear. If skin irritation occurs: Get medical advice/attention.

First-aid measures after eye contact : Rinse eyes with water as a precaution. If irritation persists, consult an eye specialist.

First-aid measures after ingestion : Do not give anything to drink. Do not induce vomiting. Call a physician immediately.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects : May cause drowsiness or dizziness.

Symptoms/effects after skin contact : Repeated exposure may cause skin dryness or cracking.

Symptoms/effects after ingestion : May be fatal if swallowed and enters airways.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Foam. Powders. Carbon dioxide.

Unsuitable extinguishing media : Strong water jet.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Highly flammable liquid and vapour. The vapours are denser than air and may travel along the ground. Distance ignition possible.

Explosion hazard : Vapour/air mixtures are explosive.

Hazardous decomposition products in case of fire : Toxic vapours may be released. Carbon oxides (CO, CO2). Hydrocarbons.

5.3. Advice for firefighters

Firefighting instructions : Cool down the containers exposed to heat with a water spray. Contain the extinguishing fluids by bunding (the product is hazardous for the environment).

Protection during firefighting : Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Avoid contact with skin and eyes. Remove all sources of ignition. Only qualified personnel equipped with suitable protective equipment may intervene.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

Protective equipment : For further information refer to section 8: "Exposure controls/personal protection".

Emergency procedures : Evacuate the danger area.

6.2. Environmental precautions

Contain the spilled material by bunding (product is hazardous for the environment). Do not discharge into drains or rivers.

6.3. Methods and material for containment and cleaning up

For containment : Recover the product with absorbent material. Absorb with : sand or inert absorbent.

Other information : Dispose of contaminated materials in accordance with current regulations.

6.4. Reference to other sections

Concerning disposal elimination after cleaning, see section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Smoking is forbidden. Avoid the build-up of electrostatic charge. Vapour extraction at source. Use non-sparking tools.

Hygiene measures : Always wash hands after handling the product. Separate working clothes from town clothes.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : The floor of the depot must be impermeable, non-combustible and designed to form a basin, in order that stored flammable liquids should not, under any circumstances, be released outside. Take all necessary measures to avoid accidental discharge of products into drains and waterways due to the rupture of containers or transfer systems.

Storage conditions : Store in a well-ventilated place. Keep cool. Keep away from ignition sources. Keep away from naked flames/heat.

Incompatible materials : Strong bases. Strong oxidizing agents.

Packaging materials : Stainless steel. Carbon steel. Polypropylene. Polyethylene.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

CYCLOPENTANE (287-92-3)	
Belgium - Occupational Exposure Limits	
Local name	Cyclopentane # Cyclopentaan
Limit value (mg/m³)	1800 mg/m³
Limit value (ppm)	600 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 02/09/2018
Denmark - Occupational Exposure Limits	
Local name	Cyclopentan
Grænseværdie (langvarig) (mg/m³)	850 mg/m³
Grænseværdie (langvarig) (ppm)	300 ppm
Regulatory reference	BEK nr 655 af 31/05/2018
France - Occupational Exposure Limits	
Local name	Cyclopentane
VME (mg/m³)	1720 mg/m³
VME (ppm)	600 ppm
Note (FR)	Valeurs recommandées/admises
Regulatory reference	Circulaire du Ministère du travail (réf.: INRS ED 984, 2016)
Greece - Occupational Exposure Limits	
Local name	Κυκλοπεντάνιο
OEL TWA (mg/m³)	1720 mg/m³
OEL TWA (ppm)	600 ppm
Regulatory reference	Π.Δ. 90/1999
Portugal - Occupational Exposure Limits	
Local name	Ciclopentano
OEL TWA (ppm)	600 ppm
Regulatory reference	Norma Portuguesa NP 1796:2014
Spain - Occupational Exposure Limits	
Local name	Ciclopentano
VLA-ED (mg/m³)	1745 mg/m³
VLA-ED (ppm)	600 ppm
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2019. INSHT
United Kingdom - Occupational Exposure Limits	
Local name	Cyclopentane
WEL TWA (mg/m³)	1800
WEL TWA (ppm)	619
Switzerland - Occupational Exposure Limits	
Local name	Cyclopentane / Cyclopentan
MAK (mg/m³)	1720 mg/m³
MAK (ppm)	600 ppm
Critical toxicity	VRS, Peau, SNC, Yeux / OAW, Haut, ZNS, Auge
Regulatory reference	www.suva.ch, 01.11.2018

CYCLOPENTANE (287-92-3)	
DNEL/DMEL (Workers)	
Long-term - systemic effects, dermal	432 mg/kg bw/day
Long-term - systemic effects, inhalation	3000 mg/m³
DNEL/DMEL (General population)	
Long-term - systemic effects,oral	214 mg/kg bw/day
Long-term - systemic effects, inhalation	643 mg/m³
Long-term - systemic effects, dermal	214 mg/kg bw/day

8.2. Exposure controls

Appropriate engineering controls:

Ensure that there is a suitable ventilation system.

Hand protection:
Nitrile-rubber protective gloves

Eye protection:
Safety glasses

Skin and body protection:
None under normal conditions

Respiratory protection:
Self-contained breathing apparatus. Filter type AX - A/P2

Environmental exposure controls:

Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Colour	: Colourless.
Odour	: Hydrocarbon-like.
Odour threshold	: No data available
pH	: Not applicable
Relative evaporation rate (butylacetate=1)	: No data available
Melting point	: -94 °C
Freezing point	: No data available
Boiling point	: 49 °C
Flash point	: -35 °C
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Flammability (solid, gas)	: Not applicable
Vapour pressure	: 36 kPa (20 °C); 68 kPa (38 °C)
Vapour pressure at 50 °C	: 1060 hPa
Relative vapour density at 20 °C	: 2.4
Relative density	: 0.745
Solubility	: Insoluble in water.
Log Pow	: 3 Potentially bioaccumulable
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available
Explosive properties	: Vapours may form explosive mixture with air.
Oxidising properties	: Non oxidizing material according to EC criteria.
Lower explosive limit (LEL)	: 1.1 vol %
Upper explosive limit (UEL)	: 8.7 vol %

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity
Highly flammable liquid and vapour.

10.2. Chemical stability
Stable at ambient temperature and under normal conditions of use.

10.3. Possibility of hazardous reactions
No dangerous reactions known under normal conditions of use.

10.4. Conditions to avoid
Heat and ignition sources. Open flame.

10.5. Incompatible materials
Strong bases. Strong oxidizing agents.

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

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute toxicity (oral) : Not classified (Based on available data, the classification criteria are not met)
Acute toxicity (dermal) : Not classified (Based on available data, the classification criteria are not met)
Acute toxicity (inhalation) : Not classified (Based on available data, the classification criteria are not met)

CYCLOPENTANE (287-92-3)	
LD50 oral rat	> 5000 mg/kg bodyweight (OECD 423 method)
LC50 inhalation rat (mg/l)	> 25.3 mg/l/4h (OECD 403 method)

Skin corrosion/irritation : Not classified (Based on available data, the classification criteria are not met)
pH: Not applicable
Additional information : Repeated exposure may cause skin dryness or cracking.
Serious eye damage/irritation : Not classified (Based on available data, the classification criteria are not met)
pH: Not applicable
Respiratory or skin sensitisation : Not classified (Based on available data, the classification criteria are not met)
Germ cell mutagenicity : Not classified (Based on available data, the classification criteria are not met)
Carcinogenicity : Not classified (Based on available data, the classification criteria are not met)
Reproductive toxicity : Not classified (Based on available data, the classification criteria are not met)
STOT-single exposure : May cause drowsiness or dizziness.
STOT-repeated exposure : Not classified (Based on available data, the classification criteria are not met)
Aspiration hazard : May be fatal if swallowed and enters airways.

SECTION 12: Ecological information

12.1. Toxicity
Hazardous to the aquatic environment, short-term (acute) : Not classified (Based on available data, the classification criteria are not met)
Hazardous to the aquatic environment, long-term (chronic) : Harmful to aquatic life with long lasting effects.

CYCLOPENTANE (287-92-3)	
LC50 fish 1	29.3 mg/l (96 Hours) (Oncorhynchus mykiss)
EC50 Daphnia 1	51.1 mg/l (48 Hours) (Daphnia magma)
ErC50 (algae)	21.6 mg/l (72 Hours) (Pseudokirchneriella subcapitata)

12.2. Persistence and degradability
No additional information available

12.3. Bioaccumulative potential

CYCLOPENTANE (287-92-3)	
Log Pow	3 Potentially bioaccumulable

12.4. Mobility in soil
No additional information available

12.5. Results of PBT and vPvB assessment

CYCLOPENTANE (287-92-3)
This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII
This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

12.6. Other adverse effects
No additional information available

SECTION 13: Disposal considerations
13.1. Waste treatment methods
Waste treatment methods : Dispose of in accordance with relevant local regulations.

Product/Packaging disposal recommendations : Destroy at an authorised site.

Additional information : The user's attention is drawn to the possible existence of specific european, national or local regulations regarding disposal.

SECTION 14: Transport information
In accordance with ADR / RID / IMDG / IATA / ADN

ADR	IMDG	IATA	RID
14.1. UN number			
UN 1146	UN 1146	UN 1146	UN 1146
14.2. UN proper shipping name			
CYCLOPENTANE	CYCLOPENTANE	Cyclopentane	CYCLOPENTANE
Transport document description			
UN 1146 CYCLOPENTANE, 3, II, (D/E)	UN 1146 CYCLOPENTANE, 3, II (< -18°C c.c.)	UN 1146 Cyclopentane, 3, II	UN 1146 CYCLOPENTANE, 3, II
14.3. Transport hazard class(es)			
3	3	3	3
			
14.4. Packing group			
II	II	II	II
14.5. Environmental hazards			
Dangerous for the environment : No	Dangerous for the environment : No Marine pollutant : No	Dangerous for the environment : No	Dangerous for the environment : No
No supplementary information available			

14.6. Special precautions for user
Overland transport

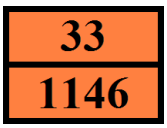
Classification code (ADR) : F1

Limited quantities (ADR) : 1l

Tank code (ADR) : LGBF

Transport category (ADR) : 2

Hazard identification number (Kemler No.) : 33

Orange plates : 

Tunnel restriction code (ADR) : D/E

EAC code : 3YE

Transport by sea

Limited quantities (IMDG) : 1 L

EmS-No. (Fire) : F-E

EmS-No. (Spillage) : S-D

Flash point (IMDG) : below -18°C c.c.

Air transport

PCA Limited quantities (IATA)	: Y341
PCA limited quantity max net quantity (IATA)	: 1L
PCA packing instructions (IATA)	: 353
PCA max net quantity (IATA)	: 5L
CAO packing instructions (IATA)	: 364
CAO max net quantity (IATA)	: 60L

Rail transport

Classification code (RID)	: F1
Limited quantities (RID)	: 1L
Tank codes for RID tanks (RID)	: LGBF
Transport category (RID)	: 2
Colis express (express parcels) (RID)	: CE7
Hazard identification number (RID)	: 33

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

Not applicable

SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

The following restrictions are applicable according to Annex XVII of the REACH Regulation (EC) No 1907/2006:	
Reference code	Applicable on
3.	CYCLOPENTANE
3(a)	CYCLOPENTANE
3(b)	CYCLOPENTANE
3(c)	CYCLOPENTANE
40.	CYCLOPENTANE

CYCLOPENTANE is not on the REACH Candidate List
CYCLOPENTANE is not on the REACH Annex XIV List
CYCLOPENTANE is not subject to Regulation (EU) No 649/2012 of the European Parliament and of the Council of 4 july 2012 concerning the export and import of hazardous chemicals.
CYCLOPENTANE is not subject to Regulation (EU) No 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants

15.1.2. National regulations

Germany

Reference to AwSV	: Water hazard class (WGK) 1, Slightly hazardous to water (Classification according to AwSV; ID No. 478)
12th Ordinance Implementing the Federal Immission Control Act - 12.BImSchV	: Is not subject of the 12. BImSchV (Hazardous Incident Ordinance)

Netherlands

SZW-lijst van kankerverwekkende stoffen	: The substance is not listed
SZW-lijst van mutagene stoffen	: The substance is not listed
NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Borstvoeding	: The substance is not listed
NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Vruchtbaarheid	: The substance is not listed
NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Ontwikkeling	: The substance is not listed

Denmark

Classification remarks	: Emergency management guidelines for the storage of flammable liquids must be followed
Danish National Regulations	: Young people below the age of 18 years are not allowed to use the product

15.2. Chemical safety assessment

A chemical safety assessment has been carried out for the substance or the mixture by the supplier

SECTION 16: Other information

Indication of changes:			
Section	**Changed item**	**Change**	**Comments**
2.2	Hazard pictograms (CLP)	Added	

Data sources : ECHA (European Chemicals Agency).

Full text of H- and EUH-statements:	
Aquatic Chronic 3	Hazardous to the aquatic environment — Chronic Hazard, Category 3
Asp. Tox. 1	Aspiration hazard, Category 1
Flam. Liq. 2	Flammable liquids, Category 2
STOT SE 3	Specific target organ toxicity — Single exposure, Category 3, Narcosis
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H336	May cause drowsiness or dizziness.
H412	Harmful to aquatic life with long lasting effects.
EUH066	Repeated exposure may cause skin dryness or cracking.

SDS EU (REACH Annex II)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

Annex to the safety data sheet

1. SE 1: Distribution of substance

1.1. Title section

Distribution of substance

ES Ref.: SE 1 ES Type: Worker Version: 1.0	Association ref code: ES 1 Date of issue: 30/09/2019

Environment		
	Contributing scenario controlling environmental exposure	ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Worker		
	Generic exposure scenario	
	General exposures (closed systems) - no sampling	PROC1
	Storage	PROC1
	General exposures (closed systems) with sample collection - With occasional controlled exposure	PROC2
	Storage with sample collection - With occasional controlled exposure	PROC2
	General exposures (closed systems) - Batch process	PROC3
	Process sampling	PROC3
	General exposures (open systems) - Batch process	PROC4
	Equipment cleaning and maintenance	PROC8a
	Bulk transfers (Open systems) - bulk open loading and unloading with local exhaust ventilation	PROC8b
	Bulk transfers (Open systems) - bulk open loading and unloading without local exhaust ventilation	PROC8b
	Drum and small package filling	PROC9
	Laboratory activities	PROC15

Processes, tasks, activities covered	Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading distribution and associated laboratory activities
Assessment method	Used ECETOC TRA model Hydrocarbon Block Method (Petrorisk)

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Contributing scenario controlling environmental exposure (ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC1	Manufacture of the substance
ERC2	Formulation into mixture
ERC3	Formulation into solid matrix
ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)
Assessment method	Hydrocarbon Block Method (Petrorisk)

Product (article) characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic, Moderately soluble in water (100 - 1000 mg/L), Inherently biodegradable, Low bioaccumulation potential

Amount used, frequency and duration of use (or from service life)

Daily amount per site	9500000 kg/day
Continuous release	
Emission days	20

Technical and organisational conditions and measures	
Bund storage facilities to prevent soil and water pollution in the event of spillage	
Prevent environmental discharge consistent with regulatory requirements	
Do not apply industrial sludge to natural soils	
Sewage sludge should be incinerated, contained or reclaimed.	
Risk from environmental exposure is driven by freshwater	
Treat air emission to provide a typical removal efficiency of	90
Provide onsite wastewater treatment.	>= 0
If discharging to municipal sewage treatment plant, provide the required onsite wastewater removal efficiency of	>= 0

Conditions and measures related to sewage treatment plant	
Not applicable as there is no release to wastewater	
Assumed domestic sewage treatment plant flow	2000
Estimated substance removal from wastewater via municipal sewage treatment	96
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal	9500000
Total efficiency of removal from wastewater after onsite and offsite municipal treatment plant) RMMs	96

Conditions and measures related to treatment of waste (including article waste)	
External treatment and disposal of waste should comply with applicable local and/or national regulations	
External recovery and recycling of waste should comply with applicable local and/or national regulations	

Other conditions affecting environmental exposure	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100

1.2.2. Control of worker exposure: Generic exposure scenario

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently)
Vapour pressure	Normal use conditions, (Temperature, Pressure)
	> 10 kPa

Amount used (or contained in articles), frequency and duration of use/exposure	
Not applicable.	
Covers daily exposures up to 8 hours	
Continuous process	

Conditions and measures related to personal protection, hygiene and health evaluation	
IF exposed: Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training	
Do not ingest.	
Avoid splashing	
Avoid contact with contaminated tools and objects	
Clean equipment and the work area every day	
Management/supervision in place to check that RMMs on place are being used correctly and OCs followed	

Other conditions affecting workers exposure	
Keep good industrial hygiene	
Assumes use at not more than 20°C above ambient temperature.	

1.2.3. Control of worker exposure: General exposures (closed systems) - no sampling (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Technical and organisational conditions and measures	
Handle substance within a closed system	

Conditions and measures related to personal protection, hygiene and health evaluation	
Handle substance within a closed system	

1.2.4. Control of worker exposure: Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Technical and organisational conditions and measures	
Store substance within a closed system	
Transfer via enclosed lines	

Conditions and measures related to personal protection, hygiene and health evaluation	
Store substance within a closed system	
Transfer via enclosed lines	

1.2.5. Control of worker exposure: General exposures (closed systems) with sample collection - With occasional controlled exposure (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Technical and organisational conditions and measures	
Handle substance within a closed system	
Use a sampling system designed to control exposure	

Conditions and measures related to personal protection, hygiene and health evaluation	
Handle substance within a closed system	
Use a sampling system designed to control exposure	

1.2.6. Control of worker exposure: Storage with sample collection - With occasional controlled exposure (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Technical and organisational conditions and measures	
Ensure dedicated sample points are provided	
Store substance within a closed system	
Transfer via enclosed lines	

Conditions and measures related to personal protection, hygiene and health evaluation	
Store substance within a closed system	
Transfer via enclosed lines	

1.2.7. Control of worker exposure: General exposures (closed systems) - Batch process (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Technical and organisational conditions and measures	
Handle substance within a closed system	
Ensure samples are obtained under containment or extract ventilation	

Conditions and measures related to personal protection, hygiene and health evaluation	
Handle substance within a closed system	
Ensure samples are obtained under containment or extract ventilation	

1.2.8. Control of worker exposure: Process sampling (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Technical and organisational conditions and measures	
Ensure samples are obtained under containment or extract ventilation	

Conditions and measures related to personal protection, hygiene and health evaluation	
Ensure samples are obtained under containment or extract ventilation	

1.2.9. Control of worker exposure: General exposures (open systems) - Batch process (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Technical and organisational conditions and measures	
Local exhaust is needed at source of vapours	
Clear transfer lines prior to de-coupling	
Transfer via enclosed lines	

Conditions and measures related to personal protection, hygiene and health evaluation	
Local exhaust is needed at source of vapours	
Clear transfer lines prior to de-coupling	
Transfer via enclosed lines	

1.2.10. Control of worker exposure: Equipment cleaning and maintenance (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Technical and organisational conditions and measures	
Retain drain downs in sealed storage pending disposal or for subsequent recycle	
Transfer via enclosed lines	

Conditions and measures related to personal protection, hygiene and health evaluation	
Retain drain downs in sealed storage pending disposal or for subsequent recycle	
Transfer via enclosed lines	

1.2.11. Control of worker exposure: Bulk transfers (Open systems) - bulk open loading and unloading with local exhaust ventilation (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Technical and organisational conditions and measures	
Provide extract ventilation to material transfer points and other openings	
Clear transfer lines prior to de-coupling	
Retain drain downs in sealed storage pending disposal or for subsequent recycle	
Transfer via enclosed lines	

Conditions and measures related to personal protection, hygiene and health evaluation	
Provide extract ventilation to material transfer points and other openings	
Clear transfer lines prior to de-coupling	
Retain drain downs in sealed storage pending disposal or for subsequent recycle	
Transfer via enclosed lines	

1.2.12. Control of worker exposure: Bulk transfers (Open systems) - bulk open loading and unloading without local exhaust ventilation (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Technical and organisational conditions and measures	
Transfer via enclosed lines	
Clear transfer lines prior to de-coupling	
Retain drain downs in sealed storage pending disposal or for subsequent recycle	

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

1.2.13. Control of worker exposure: Drum and small package filling (PROC9)

PROC9	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Technical and organisational conditions and measures	
Fill containers/cans at dedicated fill points supplied with local extract ventilation	

Conditions and measures related to personal protection, hygiene and health evaluation	
Fill containers/cans at dedicated fill points supplied with local extract ventilation	

1.2.14. Control of worker exposure: Laboratory activities (PROC15)

PROC15	Use as laboratory reagent

Technical and organisational conditions and measures	
Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	

Conditions and measures related to personal protection, hygiene and health evaluation	
Use suitable eye protection and gloves	

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure Contributing scenario controlling environmental exposure (ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

Information for contributing exposure scenario
Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal

efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)

Release route	Release rate	Release estimation method
Release fraction to air from process (initial release prior to RMM):	0.001	
Release fraction to soil from process (initial release prior to RMM):	0.00001	
Release fraction to wastewater from process (initial release prior to RMM):	0.0000001	

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.000038		0.000257	
Marine water	mg/l	0.00000038		0.00000995	
Freshwater sediment	mg/kg dwt	0.000074		0.0000514	
Marine water sediment	mg/kg dwt	0.0000031		0.00000215	
Soil	mg/kg dwt	0.00000043		0.00000093	

1.3.2. Worker exposure Generic exposure scenario

No information available

1.3.3. Worker exposure General exposures (closed systems) - no sampling (PROC1)

Information for contributing exposure scenario

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	0.02867 mg/m³	0	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.001	

1.3.4. Worker exposure Storage (PROC1)

Information for contributing exposure scenario

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	0.02867 mg/m³	0	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.001	

1.3.5. Worker exposure General exposures (closed systems) with sample collection - With occasional controlled exposure (PROC2)

Information for contributing exposure scenario

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.003	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	143.35 mg/m³	0.048	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.051	

1.3.6. Worker exposure Storage with sample collection - With occasional controlled exposure (PROC2)

Information for contributing exposure scenario

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.003	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	143.35 mg/m³	0.048	Used ECETOC TRA model
Sum RCR - Long-term -		0.051	

systemic effects			

1.3.7. Worker exposure General exposures (closed systems) - Batch process (PROC3)

Information for contributing exposure scenario			
Risk Management Measures are based on qualitative risk characterisation,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

1.3.8. Worker exposure Process sampling (PROC3)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

1.3.9. Worker exposure General exposures (open systems) - Batch process (PROC4)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.016	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.112	

1.3.10. Worker exposure Equipment cleaning and maintenance (PROC8a)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.032	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	716.77 mg/m³	0.239	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.271	

1.3.11. Worker exposure Bulk transfers (Open systems) - bulk open loading and unloading with local exhaust ventilation (PROC8b)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.016	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	12.9 mg/m³	0.004	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.02	

1.3.12. Worker exposure Bulk transfers (Open systems) - bulk open loading and unloading without local exhaust ventilation (PROC8b)

Information for contributing exposure scenario
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.016	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	430.06 mg/m³	0.143	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.159	

1.3.13. Worker exposure Drum and small package filling (PROC9)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.016	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	573.42 mg/m³	0.191	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.207	

1.3.14. Worker exposure Laboratory activities (PROC15)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	143.35 mg/m³	0.048	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.049	

1.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

1.4.1. Environment

Guidance - Environment	Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)

1.4.2. Health

Guidance - Health	Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. If scaling reveals a condition of unsafe use (i.e, RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required
Health Scaling Method	Used ECETOC TRA model

2. SE 2: Formulation & (re)packing of substances and mixtures

2.1. Title section

Formulation & (re)packing of substances and mixtures

ES Ref.: SE 2 ES Type: Worker Version: 1.0	Association ref code: ES 1 Date of issue: 30/09/2019

Environment		
	Contributing scenario controlling environmental exposure	ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 2.2.v1
Worker		
	Generic exposure scenario	
	Expositions générales (systèmes clos) - <Traduction manquante> - no sampling	PROC1
	Storage	PROC1
	General exposures (closed systems) with sample collection - Continuous process	PROC2
	Storage with sample collection	PROC2
	General exposures (open systems) - Batch process - <Traduction manquante>	PROC3
	Batch processes at elevated temperatures Closed systems	PROC3
	Process sampling	PROC3
	General exposures (open systems) - Batch process	PROC4
	Mixing operations (open systems)	PROC5
	transfer of material from one container to another	PROC8a
	Equipment cleaning and maintenance	PROC8a
	Bulk transfers	PROC8b
	Drum/batch transfers	PROC8b
	Drum and small package filling	PROC9
	Mixing operations (open systems)	PROC14
	Laboratory activities	PROC15

Processes, tasks, activities covered	Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities
Assessment method	Used ECETOC TRA model Hydrocarbon Block Method (Petrorisk)

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Contributing scenario controlling environmental exposure (ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 2.2.v1)

ERC1	Manufacture of the substance
ERC2	Formulation into mixture
ERC3	Formulation into solid matrix
ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)
Assessment method	Hydrocarbon Block Method (Petrorisk)

Product (article) characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic, Moderately soluble in water (100 - 1000 mg/L), Inherently biodegradable, Low bioaccumulation potential

Amount used, frequency and duration of use (or from service life)

Daily amount per site	120000 kg/day

Continuous release	
Emission days	100

Technical and organisational conditions and measures	
Bund storage facilities to prevent soil and water pollution in the event of spillage	
Prevent environmental discharge consistent with regulatory requirements	
Do not apply industrial sludge to natural soils	
Sewage sludge should be incinerated, contained or reclaimed.	
Common practices vary across sites thus conservative process release estimates used	
Prevent discharge of undissolved substance to or recover from onsite wastewater	
Treat air emission to provide a typical removal efficiency of	0
Provide onsite wastewater treatment.	>= 59.1

Conditions and measures related to sewage treatment plant	
Not applicable as there is no release to wastewater	
Assumed domestic sewage treatment plant flow	2000
Estimated substance removal from wastewater via municipal sewage treatment	96
Total efficiency of removal from wastewater after onsite and offsite municipal treatment plant) RMMs	96

Conditions and measures related to treatment of waste (including article waste)	
External treatment and disposal of waste should comply with applicable local and/or national regulations	
External recovery and recycling of waste should comply with applicable local and/or national regulations	

Other conditions affecting environmental exposure	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100

2.2.2. Control of worker exposure: Generic exposure scenario

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently)
Vapour pressure	Normal use conditions, (Temperature, Pressure)
	> 10 kPa

Amount used (or contained in articles), frequency and duration of use/exposure	
Not applicable.	
Covers daily exposures up to 8 hours	
Continuous process	

Conditions and measures related to personal protection, hygiene and health evaluation	
Do not ingest.	
Avoid splashing	
Avoid contact with contaminated tools and objects	
Clean equipment and the work area every day	
Management/supervision in place to check that RMMs on place are being used correctly and OCs followed	

Other conditions affecting workers exposure	
Keep good industrial hygiene	
Assumes use at not more than 20°C above ambient temperature.	

2.2.3. Control of worker exposure: Expositions générales (systèmes clos) - <Traduction manquante> - no sampling (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Technical and organisational conditions and measures	
Handle substance within a closed system	

2.2.4. Control of worker exposure: Storage (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Technical and organisational conditions and measures	
Store substance within a closed system	

2.2.5. Control of worker exposure: General exposures (closed systems) with sample collection - Continuous process (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Technical and organisational conditions and measures	
Handle substance within a closed system	
Use a sampling system designed to control exposure	

2.2.6. Control of worker exposure: Storage with sample collection (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Technical and organisational conditions and measures	
Ensure dedicated sample points are provided	
Store substance within a closed system	

2.2.7. Control of worker exposure: General exposures (open systems) - Batch process - <Traduction manquante> (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Technical and organisational conditions and measures	
Ensure samples are obtained under containment or extract ventilation	

2.2.8. Control of worker exposure: Batch processes at elevated temperatures Closed systems (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	
Formulate in enclosed or ventilated mixing vessels	
Ensure samples are obtained under containment or extract ventilation	

2.2.9. Control of worker exposure: Process sampling (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Technical and organisational conditions and measures	
Ensure samples are obtained under containment or extract ventilation	

2.2.10. Control of worker exposure: General exposures (open systems) - Batch process (PROC4)

PROC4	Chemical production where opportunity for exposure arises

Technical and organisational conditions and measures	
Local exhaust is needed at source of vapours	
Clear transfer lines prior to de-coupling	
Transfer via enclosed lines	

2.2.11. Control of worker exposure: Mixing operations (open systems) (PROC5)

PROC5	Mixing or blending in batch processes

Technical and organisational conditions and measures	
Provide extract ventilation to material transfer points and other openings	

Conditions and measures related to personal protection, hygiene and health evaluation	
Use suitable eye protection and gloves	

2.2.12. Control of worker exposure: transfer of material from one container to another (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Technical and organisational conditions and measures	
Provide extract ventilation to material transfer points and other openings	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear a respirator conforming to EN140 with Type A filter or better	
Use suitable eye protection and gloves	

2.2.13. Control of worker exposure: Equipment cleaning and maintenance (PROC8a)

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Technical and organisational conditions and measures	
Retain drain downs in sealed storage pending disposal or for subsequent recycle	
Transfer via enclosed lines	

Conditions and measures related to personal protection, hygiene and health evaluation	
Use suitable eye protection and gloves	

2.2.14. Control of worker exposure: Bulk transfers (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Technical and organisational conditions and measures	
Provide extract ventilation to material transfer points and other openings	
Clear transfer lines prior to de-coupling	
Transfer via enclosed lines	

2.2.15. Control of worker exposure: Drum/batch transfers (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Technical and organisational conditions and measures	
Ensure material transfers are under containment or extract ventilation	
Use drum pumps	

2.2.16. Control of worker exposure: Drum and small package filling (PROC9)

PROC9	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Technical and organisational conditions and measures	
Ensure material transfers are under containment or extract ventilation	
Transfer via enclosed lines	

2.2.17. Control of worker exposure: Mixing operations (open systems) (PROC14)

PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Technical and organisational conditions and measures	
Provide extract ventilation to material transfer points and other openings	

Conditions and measures related to personal protection, hygiene and health evaluation	
Use suitable eye protection and gloves	

2.2.18. Control of worker exposure: Laboratory activities (PROC15)

PROC15	Use as laboratory reagent

Technical and organisational conditions and measures	
Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	

Conditions and measures related to personal protection, hygiene and health evaluation	
Use suitable eye protection and gloves	

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure Contributing scenario controlling environmental exposure (ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 2.2.v1)

Information for contributing exposure scenario
Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)

Release route	Release rate	Release estimation method
Release fraction to air from process (initial release prior to RMM):	0.025	
Release fraction to soil from process (initial release prior to RMM):	0.0001	
Release fraction to wastewater from process (initial release prior to RMM):	0.002	

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.058		0.0853	
Marine water	mg/l	0.0058		0.00853	
Freshwater sediment	mg/kg dwt	0.47		0.0963	
Marine water sediment	mg/kg dwt	0.047		0.00963	

Soil	mg/kg dwt	0.00045		0.000231	

2.3.2. Worker exposure Generic exposure scenario

No information available

2.3.3. Worker exposure Expositions générales (systèmes clos) - <Traduction manquante> - no sampling (PROC1)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	0.02867 mg/m³	0	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.001	

2.3.4. Worker exposure Storage (PROC1)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	0.02867 mg/m³	0	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.001	

2.3.5. Worker exposure General exposures (closed systems) with sample collection - Continuous process (PROC2)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.003	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	143.35 mg/m³	0.048	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.051	

2.3.6. Worker exposure Storage with sample collection (PROC2)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.003	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	143.35 mg/m³	0.048	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.051	

2.3.7. Worker exposure General exposures (open systems) - Batch process - <Traduction manquante> (PROC3)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

2.3.8. Worker exposure Batch processes at elevated temperatures Closed systems (PROC3)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	12.9 mg/m³	0.004	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.005	

2.3.9. Worker exposure Process sampling (PROC3)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

2.3.10. Worker exposure General exposures (open systems) - Batch process (PROC4)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.016	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.112	

2.3.11. Worker exposure Mixing operations (open systems) (PROC5)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.032	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	716.77 mg/m³	0.239	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.271	

2.3.12. Worker exposure transfer of material from one container to another (PROC8a)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.032	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	716.77 mg/m³	0.239	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.271	

2.3.13. Worker exposure Equipment cleaning and maintenance (PROC8a)

Information for contributing exposure scenario
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	13.71 mg/kg bw/day	0.032	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	716.77 mg/m³	0.239	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.271	

2.3.14. Worker exposure Bulk transfers (PROC8b)

Information for contributing exposure scenario
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.016	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	430.06 mg/m³	0.143	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.159	

2.3.15. Worker exposure Drum/batch transfers (PROC8b)

Information for contributing exposure scenario
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.016	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	430.06 mg/m³	0.143	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.159	

2.3.16. Worker exposure Drum and small package filling (PROC9)

Information for contributing exposure scenario
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.016	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	573.42 mg/m³	0.191	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.207	

2.3.17. Worker exposure Mixing operations (open systems) (PROC14)

Information for contributing exposure scenario
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	3.43 mg/kg bw/day	0.008	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	716.77 mg/m³	0.239	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.247	

2.3.18. Worker exposure Laboratory activities (PROC15)

Information for contributing exposure scenario
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	143.35 mg/m³	0.048	Used ECETOC TRA model
Sum RCR - Long-term -		0.049	

systemic effects			

2.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

2.4.1. Environment

Guidance - Environment	Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)

2.4.2. Health

Guidance - Health	Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. If scaling reveals a condition of unsafe use (i.e, RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required
Health Scaling Method	Used ECETOC TRA model

3. SE 3: Use in blowing agents <Traduction manquante> - Industrial

3.1. Title section

Use in blowing agents <Traduction manquante> - Industrial

ES Ref.: SE 3 ES Type: Worker Version: 1.0	Association ref code: ES 1 Date of issue: 30/09/2019

Environment		
	Contributing scenario controlling environmental exposure	ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 4.9.v1
Worker		
	Generic exposure scenario	
	Mixing operations	PROC1
	Mixing operations - High temperature.	PROC3
	Intermediate polymer storage - High temperature.	PROC3
	Centrifuging including discharging - High temperature.	PROC3
	Mixing operations	PROC3
	Semi-bulk packaging	PROC8b
	Bulk transfers	PROC8b
	Drum and small package filling - Filling of equipment from drums or containers	PROC9
	Extrusion and expansion of polymer mass	PROC12
	Cutting and shaving	PROC12
	Collection and re-processing of shavings, cuttings, etc	PROC12
	Product packaging	PROC12
	Storage	PROC12
	Drying and storage	PROC12
	Treatment by heating - High temperature.	PROC12
	Article formation in mould - High temperature.	PROC12
	Cutting by heated wire - High temperature.	PROC12
	<Traduction manquante>	PROC12
	Compression	PROC12
	Cutting by heated wire - Machines	PROC12

Processes, tasks, activities covered	Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities
Assessment method	Used ECETOC TRA model Hydrocarbon Block Method (Petrorisk)

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: Contributing scenario controlling environmental exposure (ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 4.9.v1)

ERC1	Manufacture of the substance
ERC2	Formulation into mixture
ERC3	Formulation into solid matrix
ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 4.9.v1	Blowing agents: Industrial (SU3)
Assessment method	Hydrocarbon Block Method (Petrorisk)

Product (article) characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic, Moderately soluble in water

	(100 - 1000 mg/L), Inherently biodegradable, Low bioaccumulation potential

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	820000 kg/day
Continuous release	
Emission days	100

Technical and organisational conditions and measures	
Bund storage facilities to prevent soil and water pollution in the event of spillage	
Prevent environmental discharge consistent with regulatory requirements	
Do not apply industrial sludge to natural soils	
Sewage sludge should be incinerated, contained or reclaimed.	
Common practices vary across sites thus conservative process release estimates used	
Risk from environmental exposure is driven by freshwater	
Treat air emission to provide a typical removal efficiency of	0
Provide onsite wastewater treatment.	>= 96
If discharging to municipal sewage treatment plant, provide the required onsite wastewater removal efficiency of	>= 0

Conditions and measures related to sewage treatment plant	
Not applicable as there is no release to wastewater	
Assumed domestic sewage treatment plant flow	2000
Estimated substance removal from wastewater via municipal sewage treatment	96
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal	820000
Total efficiency of removal from wastewater after onsite and offsite municipal treatment plant) RMMs	96

Conditions and measures related to treatment of waste (including article waste)	
External treatment and disposal of waste should comply with applicable local and/or national regulations	
External recovery and recycling of waste should comply with applicable local and/or national regulations	

Other conditions affecting environmental exposure	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100

3.2.2. Control of worker exposure: Generic exposure scenario

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently)
Vapour pressure	Normal use conditions, (Temperature, Pressure)
	> 10 kPa

Amount used (or contained in articles), frequency and duration of use/exposure	
Not applicable.	
Covers daily exposures up to 8 hours	
Continuous process	

Conditions and measures related to personal protection, hygiene and health evaluation	
IF exposed: Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training	
Do not ingest.	
Avoid splashing	
Avoid contact with contaminated tools and objects	
Clean equipment and the work area every day	
Management/supervision in place to check that RMMs on place are being used correctly and OCs followed	

Other conditions affecting workers exposure	
Keep good industrial hygiene	
Assumes use at not more than 20°C above ambient temperature.	

3.2.3. Control of worker exposure: Mixing operations (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

3.2.4. Control of worker exposure: Mixing operations - High temperature. (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	
Minimise exposure by extracted full enclosure for the operation or equipment	

3.2.5. Control of worker exposure: Intermediate polymer storage - High temperature. (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	
Handle substance within a closed system	

3.2.6. Control of worker exposure: Centrifuging including discharging - High temperature. (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	
Handle substance within a closed system	

3.2.7. Control of worker exposure: Mixing operations (PROC3)

PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Technical and organisational conditions and measures	
Local exhaust is needed at source of vapours	

3.2.8. Control of worker exposure: Semi-bulk packaging (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour)	

3.2.9. Control of worker exposure: Bulk transfers (PROC8b)

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Technical and organisational conditions and measures	
Clear transfer lines prior to de-coupling	
Transfer via enclosed lines	
Use dedicated equipment	

3.2.10. Control of worker exposure: Drum and small package filling - Filling of equipment from drums or containers (PROC9)

PROC9	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Technical and organisational conditions and measures	
Fill containers/cans at dedicated fill points supplied with local extract ventilation	

3.2.11. Control of worker exposure: Extrusion and expansion of polymer mass (PROC12)

PROC12	Use of blowing agents in manufacture of foam

Technical and organisational conditions and measures	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings	

3.2.12. Control of worker exposure: Cutting and shaving (PROC12)

PROC12	Use of blowing agents in manufacture of foam

Technical and organisational conditions and measures	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings	

3.2.13. Control of worker exposure: Collection and re-processing of shavings, cuttings, etc (PROC12)

PROC12	Use of blowing agents in manufacture of foam

Technical and organisational conditions and measures	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings	

3.2.14. Control of worker exposure: Product packaging (PROC12)

PROC12	Use of blowing agents in manufacture of foam

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour)	

3.2.15. Control of worker exposure: Storage (PROC12)

PROC12	Use of blowing agents in manufacture of foam

Technical and organisational conditions and measures	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour)	

3.2.16. Control of worker exposure: Drying and storage (PROC12)

PROC12	Use of blowing agents in manufacture of foam

3.2.17. Control of worker exposure: Treatment by heating - High temperature. (PROC12)

PROC12	Use of blowing agents in manufacture of foam

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	

3.2.18. Control of worker exposure: Article formation in mould - High temperature. (PROC12)

PROC12	Use of blowing agents in manufacture of foam

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	
Local exhaust is needed at source of vapours	

3.2.19. Control of worker exposure: Cutting by heated wire - High temperature. (PROC12)

PROC12	Use of blowing agents in manufacture of foam

Technical and organisational conditions and measures	
Local exhaust is needed at source of vapours	

3.2.20. Control of worker exposure: <Traduction manquante> (PROC12)

PROC12	Use of blowing agents in manufacture of foam

Technical and organisational conditions and measures	
Local exhaust is needed at source of vapours	

3.2.21. Control of worker exposure: Compression (PROC12)

PROC12	Use of blowing agents in manufacture of foam

Technical and organisational conditions and measures	
Local exhaust is needed at source of vapours	

3.2.22. Control of worker exposure: Cutting by heated wire - Machines (PROC12)

PROC12	Use of blowing agents in manufacture of foam

Technical and organisational conditions and measures	
Local exhaust is needed at source of vapours	

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure Contributing scenario controlling environmental exposure (ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 4.9.v1)

Information for contributing exposure scenario					
Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)					
Release route		**Release rate**		**Release estimation method**	
Release fraction to air from process (initial release prior to RMM):		1			
Release fraction to soil from process (initial release prior to RMM):		0			
Release fraction to wastewater from process (initial release prior to RMM):		0.0003			
Protection target	**Unit**	**Exposure estimation**	**PNEC**	**RCR**	**Assessment method**
Freshwater	mg/l	0.015		0.0221	
Marine water	mg/l	0.0015		0.00221	

Freshwater sediment	mg/kg dwt	0.13		0.0266	
Marine water sediment	mg/kg dwt	0.013		0.00266	
Soil	mg/kg dwt	0.029		0.0149	

3.3.2. Worker exposure Generic exposure scenario

No information available

3.3.3. Worker exposure Mixing operations (PROC1)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.016	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	0.02867 mg/m³	0	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.016	

3.3.4. Worker exposure Mixing operations - High temperature. (PROC3)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	12.9 mg/m³	0.004	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.005	

3.3.5. Worker exposure Intermediate polymer storage - High temperature. (PROC3)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	12.9 mg/m³	0.004	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.005	

3.3.6. Worker exposure Centrifuging including discharging - High temperature. (PROC3)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	12.9 mg/m³	0.004	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.005	

3.3.7. Worker exposure Mixing operations (PROC3)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

3.3.8. Worker exposure Semi-bulk packaging (PROC8b)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.016	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	430.06 mg/m³	0.143	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.159	

3.3.9. Worker exposure Bulk transfers (PROC8b)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.016	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	430.06 mg/kg bw/day	143.353	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		143.369	

3.3.10. Worker exposure Drum and small package filling - Filling of equipment from drums or containers (PROC9)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	6.86 mg/kg bw/day	0.016	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	573.42 mg/m³	0.191	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.207	

3.3.11. Worker exposure Extrusion and expansion of polymer mass (PROC12)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

3.3.12. Worker exposure Cutting and shaving (PROC12)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

3.3.13. Worker exposure Collection and re-processing of shavings, cuttings, etc (PROC12)

Information for contributing exposure scenario
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels

Route of exposure and type of effects	Exposure estimate	RCR	Method
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

3.3.14. Worker exposure Product packaging (PROC12)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

3.3.15. Worker exposure Storage (PROC12)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

3.3.16. Worker exposure Drying and storage (PROC12)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

3.3.17. Worker exposure Treatment by heating - High temperature. (PROC12)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	8.6 mg/m³	0.003	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.004	

3.3.18. Worker exposure Article formation in mould - High temperature. (PROC12)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	8.6 mg/m³	0.003	Used ECETOC TRA model
Sum RCR - Long-term -		0.004	

systemic effects			

3.3.19. Worker exposure Cutting by heated wire - High temperature. (PROC12)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

3.3.20. Worker exposure <Traduction manquante> (PROC12)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

3.3.21. Worker exposure Compression (PROC12)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

3.3.22. Worker exposure Cutting by heated wire - Machines (PROC12)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	286.71 mg/m³	0.096	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.097	

3.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

3.4.1. Environment

Guidance - Environment	Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)

3.4.2. Health

Guidance - Health	Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. If scaling reveals a condition of unsafe use (i.e, RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required
Health Scaling Method	Used ECETOC TRA model

4. SE 4: Uses in cosmetics/personal care products, perfumes and fragrances

4.1. Title section

Uses in cosmetics/personal care products, perfumes and fragrances

ES Ref.: SE 4 ES Type: Consumer Version: 1.0	Association ref code: ES 1 Date of issue: 30/09/2019

Consumer		
	Contributing scenario consumer end-use	PC28, PC39

Processes, tasks, activities covered	Consumer uses e.g. as a carrier in cosmetics/personal care products, perfumes and fragrances. Note: For cosmetic and personal care products, risk assessment only required for the environment under REACH as human health is covered by alternative legislation
Assessment method	Hydrocarbon Block Method (Petrorisk)

4.2. Conditions of use affecting exposure

4.2.. (ERC8a, ERC8d, ESVOC SPERC 8.16.v1)

ERC8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)
ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)
ESVOC SPERC 8.16.v1	Other Consumer Uses: Consumer (SU21)
Assessment method	Hydrocarbon Block Method (Petrorisk)

Product (article) characteristics

Other product characteristics	Substance is complex UVCB, Water miscible, Inherently biodegradable, Low bioaccumulation potential

Daily amount per site	630 kg/day
Emission days	365

4.2.1. Control of consumer exposure: Contributing scenario consumer end-use (PC28, PC39)

PC28	Perfumes, fragrances
PC39	Cosmetics, personal care products

Product (article) characteristics

Vapour pressure	Very volatile
	> 10000 Pa

4.3. Exposure estimation and reference to its source

4.3.1. Consumer exposure Contributing scenario consumer end-use (PC28, PC39)

Information for contributing exposure scenario
No exposure assessment presented for human health

4.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)

4.4.2. Health

Guidance - Health	No exposure assessment presented for human health
Health Scaling Method	Used ECETOC TRA model

5. SE 5: Use as a fuel - Industrial

5.1. Title section

Use as a fuel - Industrial

ES Ref.: SE 5 ES Type: Worker Version: 1.0	Association ref code: ES 1 Date of issue: 30/09/2019

Environment		
	Contributing scenario controlling environmental exposure	ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 7.12a.v1
Worker		
	Generic exposure scenario	
	Expositions générales (systèmes clos) - <Traduction manquante>	PROC1
	Expositions générales (systèmes clos) - Use as a fuel	PROC1
	General exposures (closed systems) - Continuous process - <Traduction manquante>	PROC2
	Expositions générales (systèmes clos) - Use as a fuel	PROC2
	Use as a fuel	PROC16

Processes, tasks, activities covered	Covers the use as a fuel (or fuel additives and additive components) within closed or contained systems, including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste
Assessment method	Used ECETOC TRA model Hydrocarbon Block Method (Petrorisk)

5.2. Conditions of use affecting exposure

5.2.1. Control of environmental exposure: Contributing scenario controlling environmental exposure (ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 7.12a.v1)

ERC1	Manufacture of the substance
ERC2	Formulation into mixture
ERC3	Formulation into solid matrix
ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 7.12a.v1	Use as a fuel: Industrial (SU3)
Assessment method	Hydrocarbon Block Method (Petrorisk)

Product (article) characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic, Moderately soluble in water (100 - 1000 mg/L), Inherently biodegradable, Low bioaccumulation potential

Amount used, frequency and duration of use (or from service life)

Daily amount per site	250 kg/day
Annual site tonnage	5
Continuous release	
Emission days	20

Technical and organisational conditions and measures

Bund storage facilities to prevent soil and water pollution in the event of spillage	
Prevent environmental discharge consistent with regulatory requirements	
Do not apply industrial sludge to natural soils	
Sewage sludge should be incinerated, contained or reclaimed.	
Risk from environmental exposure is driven by freshwater	
Treat air emission to provide a typical removal efficiency of	95
Provide onsite wastewater treatment.	>= 0
If discharging to municipal sewage treatment plant, provide the required onsite wastewater removal efficiency of	>= 0

Conditions and measures related to sewage treatment plant	
Not applicable as there is no release to wastewater	
Assumed domestic sewage treatment plant flow	2000
Estimated substance removal from wastewater via municipal sewage treatment	96
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal	12000000
Total efficiency of removal from wastewater after onsite and offsite municipal treatment plant) RMMs	96

Conditions and measures related to treatment of waste (including article waste)	
External treatment and disposal of waste should comply with applicable local and/or national regulations	
External recovery and recycling of waste should comply with applicable local and/or national regulations	

Other conditions affecting environmental exposure	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100

5.2.2. Control of worker exposure: Generic exposure scenario

Product (article) characteristics	
Physical form of product	Liquid
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently)
Vapour pressure	Normal use conditions, (Temperature, Pressure)
	> 10 kPa

Amount used (or contained in articles), frequency and duration of use/exposure
Not applicable.
Covers daily exposures up to 8 hours
Continuous process

Conditions and measures related to personal protection, hygiene and health evaluation	
IF exposed: Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training	
Do not ingest.	
Avoid splashing	
Avoid contact with contaminated tools and objects	
Clean equipment and the work area every day	
Management/supervision in place to check that RMMs on place are being used correctly and OCs followed	

Other conditions affecting workers exposure	
Keep good industrial hygiene	
Assumes use at not more than 20°C above ambient temperature.	

5.2.3. Control of worker exposure: Expositions générales (systèmes clos) - <Traduction manquante> (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Technical and organisational conditions and measures	
Handle substance within a closed system	

Conditions and measures related to personal protection, hygiene and health evaluation	
Use suitable eye protection and gloves	

5.2.4. Control of worker exposure: Expositions générales (systèmes clos) - Use as a fuel (PROC1)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Technical and organisational conditions and measures	
Store substance within a closed system	

5.2.5. Control of worker exposure: General exposures (closed systems) - Continuous process - <Traduction manquante> (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Technical and organisational conditions and measures	
Handle substance within a closed system	

Conditions and measures related to personal protection, hygiene and health evaluation	
Use suitable eye protection and gloves	

5.2.6. Control of worker exposure: Expositions générales (systèmes clos) - Use as a fuel (PROC2)

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Technical and organisational conditions and measures	
Store substance within a closed system	

5.2.7. Control of worker exposure: Use as a fuel (PROC16)

PROC16	Use of fuels

Technical and organisational conditions and measures	
Store substance within a closed system	

5.3. Exposure estimation and reference to its source

5.3.1. Environmental release and exposure Contributing scenario controlling environmental exposure (ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 7.12a.v1)

Information for contributing exposure scenario		
Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)		
Release route	**Release rate**	**Release estimation method**
Release fraction to air from process (initial release prior to RMM):	0.05	
Release fraction to soil from process (initial release prior to RMM):	0	
Release fraction to wastewater from process (initial release prior to RMM):	0.00001	

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.0000061		0.00000897	
Marine water	mg/l	0.00000061		0.00000089	
Freshwater sediment	mg/kg dwt	0.000049		0.00001	
Marine water sediment	mg/kg dwt	0.0000049		0.000001	
Soil	mg/kg dwt	0.0000006		0.0000003	

5.3.2. Worker exposure Generic exposure scenario

No information available

5.3.3. Worker exposure Expositions générales (systèmes clos) - <Traduction manquante> (PROC1)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	0.02867 mg/m³	0	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.001	

5.3.4. Worker exposure Expositions générales (systèmes clos) - Use as a fuel (PROC1)

Information for contributing exposure scenario			
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	0.02867 mg/m³	0	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.001	

5.3.5. Worker exposure General exposures (closed systems) - Continuous process - <Traduction manquante> (PROC2)

Information for contributing exposure scenario			
Risk Management Measures are based on qualitative risk characterisation,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.003	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	143.35 mg/m³	0.048	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.051	

5.3.6. Worker exposure Expositions générales (systèmes clos) - Use as a fuel (PROC2)

Information for contributing exposure scenario			
Risk Management Measures are based on qualitative risk characterisation,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	1.37 mg/kg bw/day	0.003	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	143.35 mg/m³	0.048	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.051	

5.3.7. Worker exposure Use as a fuel (PROC16)

Information for contributing exposure scenario			
Risk Management Measures are based on qualitative risk characterisation,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels			
Route of exposure and type of effects	**Exposure estimate**	**RCR**	**Method**
Dermal - Long-term - systemic effects	0.34 mg/kg bw/day	0.001	Used ECETOC TRA model
Inhalation - Long-term - systemic effects	71.68 mg/m³	0.024	Used ECETOC TRA model
Sum RCR - Long-term - systemic effects		0.025	

5.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

5.4.1. Environment

Guidance - Environment	Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)

5.4.2. Health

Guidance - Health	Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. If scaling reveals a condition of unsafe use (i.e, RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required
Health Scaling Method	Used ECETOC TRA model