SAFETY DATA SHEET

according to REACH Regulation (EC) No. 1907/2006, as amended by UK REACH Regulations SI 2019/758

n-Butanol
10420

Version / Revision	8	**Revision Date**	20-Jan-2026
Supersedes Version	7.00***	**Issuing date**	20-Jan-2026

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

1.1. Product identifier

Identification of the substance/preparation **n-Butanol**

CAS-No 71-36-3
EC No. 200-751-6

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

Identified uses
Intermediate
Formulation
Distribution of substance
coatings
cleaning agent
Lubricants and lubricant additives
Metal working fluids / rolling oils
laboratory chemicals
Polymer processing
consumer care product

Uses advised against None

1.3. Details of the supplier of the safety data sheet

Company/Undertaking Identification
OXEA GmbH
Rheinpromenade 4A
D-40789 Monheim
Germany***

Product Information
Product Stewardship
FAX: +49 (0)208 693 2053
email: sc.psq@oxea.com

1.4. Emergency telephone number

Emergency telephone number +44 (0) 1235 239 670 (UK)
available 24/7

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

This substance is classified based on Directive 1272/2008/EC and its amendments (CLP Regulation)

Flammable liquid Category 3, H226
Acute oral toxicity Category 4, H302
Skin corrosion/irritation Category 2, H315
Serious eye damage/eye irritation Category 1, H318
Target Organ Systemic Toxicant - Single exposure Category 3, H335, Category 3, H336

Additional information
For full text of Hazard- and EU Hazard-statements see SECTION 16.

2.2. Label elements

Labelling according to Regulation 1272/2008/EC and its amendments (CLP Regulation).

Hazard pictograms



Signal word	**Danger**
Hazard statements	H226: Flammable liquid and vapour. H302: Harmful if swallowed. H315: Causes skin irritation. H318: Causes serious eye damage. H335: May cause respiratory irritation. H336: May cause drowsiness or dizziness.
Precautionary statements	P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P261: Avoid breathing gas/mist/vapours. P280: Wear protective gloves/protective clothing/eye protection/face protection. P303 + P361 + P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing. P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P310: Immediately call a POISON CENTER/doctor. P403 + P235: Store in a well ventilated place. Keep cool.

2.3. Other hazards

Vapour is heavier than air and can travel considerable distance to a source of ignition and flashback
Vapours may form explosive mixture with air
Components of the product may be absorbed into the body by inhalation, ingestion and through the skin

PBT and vPvB assessment	This substance is not considered to be persistent, bioaccumulating nor toxic (PBT), nor very persistent nor very bioaccumulating (vPvB)
Endocrine disrupting assessments	The substance is not listed on the candidate list according to Art. 59(1), REACh. The substance was not assessed as having endocrine disrupting properties according to regulation 2017/2100/EU or 2018/605/EU.

SECTION 3: Composition / information on ingredients

3.1. Substances

Component	CAS-No	1272/2008/EC	Concentration (%)

Butan-1-ol	71-36-3	Flam. Liq. 3; H226 Acute Tox. 4; H302 Skin Irrit. 2; H315 Eye Dam. 1; H318 STOT SE 3; H335 STOT SE 3; H336	> 99,80

For full text of Hazard- and EU Hazard-statements see SECTION 16.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation
Keep at rest. Aerate with fresh air. When symptoms persist or in all cases of doubt seek medical advice.

Skin
Wash off immediately with soap and plenty of water. When symptoms persist or in all cases of doubt seek medical advice.

Eyes
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses. Immediate medical attention is required.

Ingestion
Rinse mouth. Call a physician immediately. If conscious, drink plenty of water. Do not induce vomiting without medical advice.

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

Main symptoms
cough, headache, dizziness, drowsiness, nausea, vomiting, abdominal pain, unconsciousness, diarrhea.

Special hazard
Lung irritation, Pneumonia.

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

General advice
Remove contaminated, soaked clothing immediately and dispose of safely. If unconscious place in recovery position and seek medical advice. First aider needs to protect himself.

Treat symptomatically. If ingested, irrigate the stomach using activated charcoal. Chemical pneumonitis could follow respiratory exposure.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media
dry chemical, carbon dioxide (CO2), water spray, alcohol-resistant foam

Unsuitable Extinguishing Media
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Under conditions giving incomplete combustion, hazardous gases produced may consist of:
carbon monoxide (CO)
carbon dioxide (CO2)
Combustion gases of organic materials must in principle be graded as inhalation poisons
Vapour is heavier than air and can travel considerable distance to a source of ignition and flashback
Vapours may form explosive mixture with air

5.3. Advice for firefighters

Special protective equipment for firefighters
Fire fighter protection should include a self-contained breathing apparatus (NIOSH-approved or EN 133) and full fire-fighting turn out gear.

Precautions for firefighting
Cool containers / tanks with water spray. Dike and collect water used to fight fire. Keep people away from and upwind of fire. Do not allow run-off from fire fighting to enter drains or water courses. Foam should be applied in large quantities as it is broken down to some extent by the product.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: For personal protective equipment see section 8. Avoid contact with skin and eyes. Avoid breathing vapors or mists. Keep people away from and upwind of spill/leak. Ensure adequate ventilation, especially in confined areas. Keep away from heat and sources of ignition.
For emergency responders: Personal protection see section 8.

6.2. Environmental precautions

Prevent further leakage or spillage. Do not discharge product into the aquatic environment without pretreatment (biological treatment plant).

6.3. Methods and material for containment and cleaning up

Methods for containment
Stop the flow of material, if possible without risk. Dike spilled material, where this is possible.

Methods for cleaning up
Soak up with inert absorbent material (e.g. universal binder). Keep in suitable, closed containers for disposal. If liquid has been spilt in large quantities clean up promptly by scoop or vacuum. Dispose of in accordance with local regulations. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours).

6.4. Reference to other sections

For personal protective equipment see section 8.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Further info may be available in the appropriate Exposure scenarios in the annex to this SDS.

Advice on safe handling
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Provide sufficient air exchange and/or exhaust in work rooms.

Hygiene measures
When using, do not eat, drink or smoke. Take off all contaminated clothing immediately. Wash hands before breaks and immediately after handling the product.

Incompatible products
strong oxidizing agents
acids
acid chlorides
reducing agents

7.2. Conditions for safe storage, including any incompatibilities

Advice on protection against fire and explosion
Keep away from sources of ignition - No smoking. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). In case of fire, emergency cooling with water spray should be available. Ground and bond containers when transferring material. Vapour is heavier than air and can travel considerable distance to a source of ignition and flashback. Vapours may form explosive mixture with air.

Technical measures/Storage conditions
Keep containers tightly closed in a cool, well-ventilated place. Handle and open container with care.

Suitable material
stainless steel, mild steel

Unsuitable material
Attacks some forms of plastic and rubber, Natural Rubber

Temperature class
T2

7.3. Specific end use(s)

Intermediate
Formulation
Distribution of substance
coatings
cleaning agent
Lubricants and lubricant additives
Metal working fluids / rolling oils
laboratory chemicals
Polymer processing
consumer care product
For specific end use information see the annex of this safety data sheet

SECTION 8: Exposure controls / personal protection

8.1. Control parameters

Exposure limits European Union

No exposure limits established

Exposure limits UK

EH40 WELs

Component	TWA (mg/m³)	TWA (ppm)	STEL (mg/m³)	STEL (ppm)
Butan-1-ol CAS: 71-36-3			154	50

EH40 WELs and Appendix 5 Carcinogens

Component	Skin Absorption	Asphyxia	Respiratory irritant	included w/o limits	Carcinogen
Butan-1-ol CAS: 71-36-3	Yes				

Note
For details and further information please refer to the original regulation.

DNEL & PNEC

Butan-1-ol, CAS: 71-36-3

Workers

DN(M)EL - long-term exposure - systemic effects - Inhalation	Low hazard (no threshold derived)
DN(M)EL - acute / short-term exposure - systemic effects - Inhalation	No hazard identified
DN(M)EL - long-term exposure - local effects - Inhalation	310 mg/m³
DN(M)EL - acute / short-term exposure - local effects - Inhalation	Low hazard (no threshold derived)
DN(M)EL - long-term exposure - systemic effects - Dermal	Low hazard (no threshold derived)
DN(M)EL - acute / short-term exposure - systemic effects - Dermal	No hazard identified
DN(M)EL - long-term exposure - local effects - Dermal	Low hazard (no threshold derived)
DN(M)EL - acute / short-term exposure - local effects - Dermal	Low hazard (no threshold derived)
DN(M)EL - local effects - eyes	Medium hazard (no threshold derived)

General population

DN(M)EL - long-term exposure - systemic effects - Inhalation	55,357 mg/m³
DN(M)EL - acute / short-term exposure - systemic effects - Inhalation	No hazard identified
DN(M)EL - long-term exposure - local effects - Inhalation	155 mg/m³
DN(M)EL - acute / short-term exposure - local effects - Inhalation	Low hazard (no threshold derived)
DN(M)EL - long-term exposure - systemic effects - Dermal	3,125 mg/kg bw/day
DN(M)EL - acute / short-term exposure - systemic effects - Dermal	No hazard identified
DN(M)EL - long-term exposure - local effects - Dermal	Low hazard (no threshold derived)
DN(M)EL - acute / short-term exposure - local effects - Dermal	Low hazard (no threshold derived)
DN(M)EL - long-term exposure - systemic effects - Oral	1,562 mg/kg bw/day
DN(M)EL - acute / short-term exposure - systemic effects - Oral	No hazard identified
DN(M)EL - local effects - eyes	Medium hazard (no threshold derived)

Environment

PNEC aqua - freshwater	0,082 mg/l
PNEC aqua - marine water	0,008 mg/l
PNEC aqua - intermittent releases	2,25 mg/l
PNEC STP	2476 mg/l
PNEC sediment - freshwater	0,324 mg/kg dw
PNEC sediment - marine water	0,032 mg/kg dw
PNEC Air	No hazard identified
PNEC soil	0,166 mg/kg dw
Secondary poisoning	No potential for bioaccumulation

8.2. Exposure controls

Special adaptations (REACh)
Not applicable.

Appropriate Engineering controls
General or dilution ventilation is frequently insufficient as the sole means of controlling employee exposure. Local ventilation is usually preferred. Explosion-proof equipment (for example fans, switches, and grounded ducts) should be used in mechanical ventilation systems.

Personal protective equipment

General industrial hygiene practice
Avoid contact with skin, eyes and clothing. Do not breathe vapours or spray mist. Ensure that eyewash stations and safety showers are close to the workstation location.

Hygiene measures
When using, do not eat, drink or smoke. Take off all contaminated clothing immediately. Wash hands before breaks and immediately after handling the product.

Eye protection
Tightly fitting safety goggles. In addition to goggles, wear a face shield if there is a reasonable chance for splash to the face.
Equipment should conform to EN 166

Hand protection
Wear protective gloves. Recommendations are listed below. Other protective material may be used, depending on the situation, if adequate degradation and permeation data is available. If other chemicals are used in conjunction with this chemical, material selection should be based on protection for all chemicals present.

Suitable material	butyl-rubber
Evaluation	according to EN 374: level 6
Glove thickness	approx 0,3 mm
Break through time	> 480 min

Suitable material	nitrile rubber
Evaluation	according to EN 374: level 6
Glove thickness	approx 0,55 mm
Break through time	> 480 min

Skin and body protection
Impervious clothing. Wear face-shield and protective suit for abnormal processing problems.

Respiratory protection
Respirator with A filter. Full mask with above mentioned filter according to producers using requirements or

self-contained breathing apparatus. Equipment should conform to EN 136 or EN 140 and EN 143.

Environmental exposure controls
If possible use in closed systems. If leakage can not be prevented, the substance needs to be suck off at the emersion point, if possible without danger. Observe the exposure limits, clean exhaust air if needed. If recycling is not practicable, dispose of in compliance with local regulations. Inform the responsible authorities in case of leakage into the atmosphere, or of entry into waterways, soil or drains.

Additional advice
Further details on substance data can be found in the registration dossier under the following link: http://echa.europa.eu/information-on-chemicals/registered-substances. For specific exposure controls see the annex to this safety data sheet.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	liquid
Colour	colourless
Odour	alcoholic
Odour threshold	No data available
Melting point/freezing point	< -90 °C (Pour point)
Boiling point or initial boiling point and boiling range	119 °C @ 1013 hPa
Method	OECD 103
Flammability	Ignitable
Lower explosion limit	1,4 Vol %
Upper explosion limit	11,3 Vol %
Flash point	35 °C @ 1013 hPa
Method	ISO 2719
Autoignition temperature	355 °C @ 1013 hPa
Method	DIN 51794
Decomposition temperature	No data available
pH	neutral
Kinematic Viscosity	3,638 mm²/s @ 20 °C
Method	DIN 51562
Solubility	66 g/l @ 20 °C, in water, OECD 105
Partition coefficient n-octanol/water (log value)	1 @ 25 °C (77 °F) OECD 117

Vapour pressure

Values [hPa]	Values [kPa]	Values [atm]	@ °C	@ °F	Method
10	1	0,010	20	68	DIN EN 13016-2
53	5,3	0,052	50	122	DIN EN 13016-2

Density and/or relative density

Values	@ °C	@ °F	Method
0,81	20	68	DIN 51757

Relative vapour density	2,6 (Air = 1) @ 20 °C (68 °F)
Particle characteristics	not applicable

9.2. Other information

Explosive properties	Does not apply, substance is not explosive. There are no chemical groups associated with explosive properties
Oxidizing properties	Does not apply, substance is not oxidising. There are no chemical groups

	associated with oxidizing properties
Molecular weight	74,12
Molecular formula	C4 H10 O
log Koc	0,54 calculated
Refractive index	1,399 @ 20 °C
Surface tension	69,9 mN/m (1 g/l @ 20°C (68°F)), OECD 115
Evaporation rate	No data available

SECTION 10: Stability and Reactivity

10.1. Reactivity

The reactivity of the product corresponds to the typical reactivity shown by the substance group as described in any text book on organic chemistry.

10.2. Chemical stability

Stable under recommended storage conditions.

10.3. Possibility of hazardous reactions

Vapours may form explosive mixture with air.

10.4. Conditions to avoid

Avoid contact with heat, sparks, open flame and static discharge. Avoid any source of ignition.

10.5. Incompatible materials

strong oxidizing agents, acids, acid chlorides, reducing agents.

10.6. Hazardous decomposition products

No decomposition if stored and applied as directed.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Likely routes of exposure Ingestion, Inhalation, Eye contact, Skin contact

Acute toxicity				
Butan-1-ol (71-36-3)				
Routes of Exposure	Endpoint	Values	Species	Method
Oral	LD50	2292 mg/kg	rat, female	OECD 401
Inhalative	LC0	> 17,76 mg/l (4h)	rat, male/female	OECD 403
Dermal	LD50	3430 mg/kg	rabbit male	OECD 402

Butan-1-ol, CAS: 71-36-3
Assessment
Based on available data, the classification criteria are not met for:
Acute oral toxicity
Acute dermal toxicity
Acute inhalation toxicity

Irritation and corrosion				
Butan-1-ol (71-36-3)				
Target Organ Effects	Species	Result	Method	
Skin	rabbit	irritating		2h
Eyes	rabbit	severe irritation	OECD 405	
Respiratory tract	human	irritating (up 200 ppm)		10 years
Respiratory tract	human	Low irritating potential		5 min
Respiratory tract	rat	irritating		7h

Butan-1-ol, CAS: 71-36-3
Assessment
The available data lead to the classification given in section 2

Sensitization				
Butan-1-ol (71-36-3)				
Target Organ Effects	Species	Evaluation	Method	
Skin	guinea pig	not sensitizing		read across Weight of evidence

Butan-1-ol, CAS: 71-36-3
Assessment
Based on available data, the classification criteria are not met for:
Skin sensitization
For respiratory sensitization, no data are available

Subacute, subchronic and prolonged toxicity				
Butan-1-ol (71-36-3)				
Type	Dose	Species	Method	
Subchronic toxicity	NOAEL: 125 mg/kg/d	rat, male/female		Oral
Subchronic toxicity	LOAEL: 500 mg/kg/d (90d)	rat, male/female		Oral
Subchronic toxicity	NOAEL: ~ 2,35 mg/l/d (90d)	rat, male/female	EPA OTS 798.2450	Inhalation read across

Butan-1-ol, CAS: 71-36-3
Assessment
Based on available data, the classification criteria are not met for:
STOT RE

Carcinogenicity, Mutagenicity, Reproductive toxicity					
Butan-1-ol (71-36-3)					
Type	Dose	Species	Evaluation	Method	
Mutagenicity		V79 cells, Chinese hamster	negative	OECD 476 (Mammalian Gene Mutation) HPRT	In vitro study
Mutagenicity		V79 cells, Chinese hamster	negative	Chromosomal Aberration	In vitro study
Mutagenicity		Salmonella typhimurium	negative	Ames test	
Mutagenicity		mouse male/female	negative	OECD 474	Oral in vivo micronucleus test

Reproductive toxicity	NOAEL 18,5 mg/l	rat, parental			Inhalation
Reproductive toxicity	NOAEL 18,5 mg/l	rat, 1. Generation, male/female			Inhalation
Reproductive toxicity	NOAEL 5000 mg/kg/d	rat, parental, female		Oral Systemic toxicity	
Developmental Toxicity	NOAEL 1454 mg/kg/d	rat		OECD 414, Oral	Maternal toxicity, Fetal toxicity
Developmental Toxicity	NOAEL 5654 mg/kg/d	rat		OECD 414, Oral	Teratogenicity
Developmental Toxicity	NOAEL 10,8 mg/l	rat		Inhalation	Maternal toxicity, Fetal toxicity
Developmental Toxicity	NOAEL 24,7 mg/l	rat		Inhalation	Teratogenicity
Carcinogenicity	no carcinogenic potential			QSAR	
Reproductive toxicity	NOAEL 500 mg/kg/d	rat, male/female		Oral	
Reproductive toxicity	NOAEC: 2000 ppm	rat, male/female		OECD 416 Inhalation	Fertility read across
Reproductive toxicity	LOEL: 300 mg/kg/d	rat, 1. Generation, male/female		Oral	

Butan-1-ol, CAS: 71-36-3
CMR Classification
The available data on CMR properties are summarized in the table above. They do not indicate a classification into categories 1A or 1B
Evaluation
In vitro tests did not show mutagenic effects
Did not show mutagenic effects in animal experiments
In the absence of specific alerts no cancer testing is required

Butan-1-ol, CAS: 71-36-3
Main symptoms
cough, headache, dizziness, drowsiness, nausea, vomiting, abdominal pain, unconsciousness, diarrhoea.
Target Organ Systemic Toxicant - Single exposure
The available data lead to the classification given in section 2
Target Organ Systemic Toxicant - Repeated exposure
Based on available data, the classification criteria are not met for:
STOT RE
Aspiration toxicity
Based on the viscosity a potential aspiration hazard cannot be excluded

11.2. Information on other hazards

Endocrine disrupting properties
The substance has not been identified as having endocrine disrupting properties in accordance with section 2.3.
Butan-1-ol, CAS: 71-36-3
Other adverse effects
Components of the product may be absorbed into the body by inhalation, ingestion and through the skin.
Note
Handle in accordance with good industrial hygiene and safety practice. Further details on substance data can be found in the registration dossier under the following link:
http://echa.europa.eu/information-on-chemicals/registered-substances.

SECTION 12: Ecological information

12.1. Toxicity

Acute aquatic toxicity			
Butan-1-ol (71-36-3)			
Species	Exposure time	Dose	Method
Pimephales promelas (fathead minnow)	96h	LC50: 1376 mg/l	OECD 203
Daphnia magna (Water flea)	48h	EC50: 1328 mg/l	OECD 202
Pseudokirchneriella subcapitata	96h	EC50: 225 mg/l (Growth rate)	OECD 201
Pseudomonas putida	17 h	EC50: 4390 mg/l	DIN 38412, part 8

Long term toxicity				
Butan-1-ol (71-36-3)				
Type	Species	Dose	Method	
Reproductive toxicity	Daphnia magna (Water flea)	NOEC: 4,1 mg/l (21d)	OECD 211	
Reproductive toxicity	Daphnia magna (Water flea)	EC50: 18 mg/l/21d	OECD 211	
Aquatic toxicity	Pseudokirchneriella subcapitata	EC10: 134 mg/l (96 h) NOAEC: 129 mg/l (96 h)	OECD 201 Growth rate	

Terrestrial toxicity				
Butan-1-ol (71-36-3)				
Species	Exposure time	Dose	Type	Method
Lactuca sativa (Lettuce)	3 d	EC50: ~ 390 mg/l	germination	germination inhibition test

12.2. Persistence and degradability

Butan-1-ol, CAS: 71-36-3
Biodegradation
92 % (15 d), Sewage, aerobic, domestic, non-adapted, BOD.

Abiotic Degradation		
Butan-1-ol (71-36-3)		
Type	Result	Method
Hydrolysis	No data available	
Photolysis	Half-life (DT50): 46 - 53,5 h	measured

12.3. Bioaccumulative potential

Butan-1-ol (71-36-3)		
Type	Result	Method
log Pow	1 @ 25 °C	OECD 117
BCF	3,16	calculated

12.4. Mobility in soil

Butan-1-ol (71-36-3)		
Type	Result	Method
Surface tension	69,9 mN/m (1 g/l @ 20°C (68°F))	OECD 115
Adsorption/Desorption	log Koc: 0,54	calculated
Distribution to environmental compartments	Air: 27,07 Soil: 0,04 Water: 72,85 Sediment: 0,04 Suspended sediment: 0 Biota: 0	Calculation according Mackay, Level I

12.5. Results of PBT and vPvB assessment

Butan-1-ol, CAS: 71-36-3
PBT and vPvB assessment
This substance is not considered to be persistent, bioaccumulating nor toxic (PBT), nor very persistent nor very bioaccumulating (vPvB)

12.6. Endocrine disrupting properties

The substance has not been identified as having endocrine disrupting properties in accordance with section 2.3.

12.7. Other adverse effects

Butan-1-ol, CAS: 71-36-3
No data available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product Information
Disposal required in compliance with all waste management related state and local regulations. The choice of the appropriate method of disposal depends on the product composition by the time of disposal as well as the local statutes and possibilities for disposal.
Hazardous waste according to European Waste Catalogue (EWC)

Uncleaned empty packaging
Contaminated packaging should be emptied as far as possible and after appropriate cleansing may be taken for reuse.

SECTION 14: Transport information

ADR/RID

14.1. UN number or ID number	UN 1120
14.2. UN proper shipping name	Butanols
14.3. Transport hazard class(es)	3
14.4. Packing group	III
14.5. Environmental hazards	no
14.6. Special precautions for user	
ADR Tunnel restriction code	(D/E)
Classification Code	F1

Hazard Number	30

ADN — ADN: Container and Tanker

14.1. UN number or ID number	UN 1120
14.2. UN proper shipping name	Butanols
14.3. Transport hazard class(es)	3
14.4. Packing group	III
14.5. Environmental hazards	no
14.6. Special precautions for user	
Classification Code	F1
Hazard Number	30

ICAO-TI / IATA-DGR

14.1. UN number or ID number	UN 1120
14.2. UN proper shipping name	Butanols
14.3. Transport hazard class(es)	3
14.4. Packing group	III
14.5. Environmental hazards	no
14.6. Special precautions for user	no data available

IMDG

14.1. UN number or ID number	UN 1120
14.2. UN proper shipping name	Butanols
14.3. Transport hazard class(es)	3
14.4. Packing group	III
14.5. Environmental hazards	no
14.6. Special precautions for user	
EmS	F-E, S-D
14.7. Maritime transport in bulk according to IMO instruments	
Product name	n-Butyl alcohol
Ship type	3
Pollution category	Z
Hazard class	P

SECTION 15: Regulatory information

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

Regulation 1272/2008, Annex VI

Butan-1-ol, CAS: 71-36-3

Classification	Flam. Liq. 3; H226 Acute Tox. 4*; H302 STOT SE 3; H335 Skin Irrit. 2; H315 Eye Dam. 1; H318

	STOT SE 3; H336
Hazard pictograms	GHS02 Flame
	GHS05 Corrosion
	GHS07 Exclamation mark
Signal word	Danger
Hazard statements	H226, H302, H335, H315, H318, H336

DI 2012/18/EU (Seveso III)

Category	Annex I, part 1: P5a - c; depending on conditions

VOC according to DI 2010/75/EU (Industry Emission Directive)

Component	Status
Butan-1-ol CAS: 71-36-3	regulated

The REACH etc. (Amendment etc.) (EU Exit) Regulations 2019 No. 758

Component	Status
Butan-1-ol CAS: 71-36-3	The substance is/will be pre-registered

For details and further information please refer to the original regulation.

International Inventories

Butan-1-ol, CAS: 71-36-3
AICS (AU)
DSL (CA)
IECSC (CN)
EC-No. 2007516 (EU)
ENCS (2)-3049 (JP)
ISHL (2)-3049 (JP)
ISHL 2-(8)-299 (JP)
KECI KE-03867 (KR)
INSQ (MX)
PICCS (PH)
TSCA (US)
NZIoC (NZ)
TCSI (TW)

National regulatory information Great Britain

Releases to air (Pollution Inventory Substances)
not subject

Releases to water (Pollution Inventory Substances)
not subject

Releases to sewer (Pollution Inventory Substances)
not subject
For details and further information please refer to the original regulation

15.2. Chemical safety assessment

The Chemical Safety Report (CSR) has been generated. For Exposure Scenarios see the annex.

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3
H226: Flammable liquid and vapour.
H302: Harmful if swallowed.
H315: Causes skin irritation.
H318: Causes serious eye damage.
H335: May cause respiratory irritation.
H336: May cause drowsiness or dizziness.

Abbreviations
A table of terms and abbreviations can be found under the following link:
http://echa.europa.eu/documents/10162/13632/information_requirements_r20_en.pdf

Training advice
For effective first-aid, special training / education is needed.

Sources of key data used to compile the datasheet
Information contained in this safety data sheet is based on OXEA owned data and public sources deemed valid or acceptable. The absence of data elements required by OSHA, ANSI or Annex II, Regulation 1907/2006/EC indicates, that no data meeting these requirements is available.

Further information for the safety data sheet
Changes against the previous version are marked by ***. Observe national and local legal requirements. For more information, other material safety data sheets or technical data sheets please consult the OXEA homepage (www.oxae.com).

Disclaimer
For industrial use only. The information contained herein is accurate to the best of our knowledge. We do not suggest or guarantee that any hazards listed herein are the only ones which exist. OXEA makes no warranty of any kind, express or implied, concerning the safe use of this material in your process or in combination with other substances. User has the sole responsibility to determine the suitability of the materials for any use and the manner of use contemplated. User must meet all applicable safety and health standards.

End of Safety Data Sheet

Annex to the extended Safety Data Sheet (eSDS)

General information

For consumer applications in the following usage areas please contact OQ (sc.psq@oxea.com):
Uses in coatings
Use in Cleaning Agents
Lubricants
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

Other combinations of operational conditions may also be safe. Please contact OXEA in case your local

operational conditions differ from the ones described below and you are unsure if they are also safe

For specific information regarding the SPERC used please refer to the ESIG webpage https://www.esig.org/reach-ges/environment/
A quantitative approach used to conclude safe use for:
Environmental compartment
Long term local hazards via inhalation
Long-term Systemic effects via inhalation
A qualitative approach used to conclude safe use for:
For dermal/eye local exposure

Operational conditions and risk management measures
Following operational conditions and risk management measures, are based on qualitative risk characterisation:
Avoid frequent and direct contact with substance
Wear protective gloves and eye/face protection
Minimization of manual phases
Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

Exposure scenario identification

1	**Industrial use resulting in manufacture of another substance (use of intermediates)**
2	**Formulation & (re)packing of substances and mixtures**
3	**Distribution of substance**
4	**Uses in coatings**
5	**Uses in coatings**
6	**Use in Cleaning Products**
7	**Use in Cleaning Products**
8	**Lubricants**
9	**Lubricants**
10	**Metal working fluids / rolling oils**
11	**Metal working fluids / rolling oils**
12	**Use in laboratories**
13	**Polymer processing**

Number of the ES 1

Short title of the exposure scenario

Industrial use resulting in manufacture of another substance (use of intermediates)

List of use descriptors

Sector of uses [SU]
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites
SU8: Manufacture of bulk, large scale chemicals (including petroleum products)
SU9: Manufacture of fine chemicals

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Environmental release categories [ERC]
ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Manufacture of the substance or use as an intermediate, process chemical or extracting agent. Includes recycling/ recovery, material transfers, storage, maintenance and loading (ncluding marine vessel/barge, road/rail car and bulk container).

Further explanations
Industrial use

assessment tool used:
Chesar 3.2
liquid
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently)
Assumes an advanced standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario **1**
Contributing exposure scenario controlling environmental exposure for ERC 6a

Amounts used
Daily amount per site: 735.5 to
Annual amount per site: 242705 to
Fraction of EU tonnage used in region: 1
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from process: 5E-3%
Release fraction to wastewater from process: 2%
Release fraction to soil from process: 0.1%
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Onsite treatment off-air. Upgrade Systems in place or implement addional treatment. Assumed Efficiency: 99.9 % Onsite treatment wastewater. Apply acclimated biological treatment. Assumed Efficiency: 99.99 %
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m^3/d): 2000
Do not apply industrial sludge to natural soils
The minimum grade of elimination in the sewage plant is (%): 87.45
Water flow in sewage/river (m^3/day): 18000

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for PROC 1

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **3**
Contributing exposure scenario controlling worker exposure for PROC 2

Frequency and duration of use
8 h (full shift)

Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for
PROC 3

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for
PROC 4

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **6**
Contributing exposure scenario controlling worker exposure for
PROC 8a

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **7**
Contributing exposure scenario controlling worker exposure for
PROC 8b

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 95 % (inhalative).

Number of the contributing scenario **8**
Contributing exposure scenario controlling worker exposure for
PROC 9

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker

provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Exposure estimation and reference to its source

Environment
PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 0.014 mg/l; RCR: 0.165
Fresh Water (Sediment)	PEC: 0.053 mg/kg dw; RCR: 0.165
Marine Water (Pelagic)	PEC: 1.41E-3 mg/l; RCR: 0.172
Marine Water (Sediment)	PEC: 5.57E-3 mg/kg dw; RCR: 0.172
Agricultural Soil	PEC: 1.58E-3 mg/kg dw; RCR: 0.095
Sewage Treatment Plant (Effluent)	PEC: 0.092 mg/l; RCR: < 0.01

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]. Exposure estimates are given for either short-term or long-term exposure depending on which lead to more conservative risk characterisation ratios.

Proc 1	EE(inhal): 0.031
Proc 2	EE(inhal): 15.44
Proc 3	EE(inhal): 30.88
Proc 4	EE(inhal): 61.77
Proc 8a	EE(inhal): 15.44
Proc 8b	EE(inhal): 3.861
Proc 9	EE(inhal): 15.44

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 1	RCR(inhal): < 0.01
Proc 2	RCR(inhal): 0.05
Proc 3	RCR(inhal): 0.10
Proc 4	RCR(inhal): 0.199
Proc 8a	RCR(inhal): 0.05
Proc 8b	RCR(inhal): 0.012
Proc 9	RCR(inhal): 0.05

Number of the ES 2

Short title of the exposure scenario

Formulation & (re)packing of substances and mixtures

List of use descriptors

Sector of uses [SU]
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites
SU10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure

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

Environmental release categories [ERC]
ERC2: Formulation of preparations (mixtures)

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
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, maintenanance and associated laboratory activities.

Further explanations
Industrial use
Assessment tool used:
Chesar 3.2
liquid
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently).
Assumes an advanced standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario **1**
Contributing exposure scenario controlling environmental exposure for ERC 2

Further specification
Specific Environmental Release Categories [SPERC], SpERC ESVOC 2.2.v1 (ESVOC 4), release factors for (Sp)ERC were modified.
Amounts used
Daily amount per site: 133 to
Annual amount per site: 40000 to
Other given operational conditions affecting environmental exposure
Indoor use
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from process: 2.5E-3%
Release fraction to wastewater from process: 5E-7%
Release fraction to soil from process: 0.01%
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Onsite treatment off-air. Upgrade Systems in place or implement addional treatment. Assumed Efficiency: 95 % Onsite treatment wastewater. Apply acclimated biological treatment. Assumed Efficiency: 99.9 % Upgrade of the system in place or additional air treatment measures, such as wet scrubber and/or air filtration and/or thermal oxidation and/or vapour recovery systems, in order to achieve a reduction of the air emissions.
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m^3/d): 2000
Water flow in sewage/river (m^3/day): 18000
The minimum grade of elimination in the sewage plant is (%): 87.45
Do not apply industrial sludge to natural soils

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for

PROC 1

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **3**
Contributing exposure scenario controlling worker exposure for
PROC 2

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for
PROC 3

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for
PROC 4

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **6**
Contributing exposure scenario controlling worker exposure for
PROC 5

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **7**
Contributing exposure scenario controlling worker exposure for
PROC 8a

Frequency and duration of use
8 h (full shift)

Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario 8
Contributing exposure scenario controlling worker exposure for PROC 8b

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 95 % (inhalative).

Number of the contributing scenario 9
Contributing exposure scenario controlling worker exposure for PROC 9

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario 10
Contributing exposure scenario controlling worker exposure for PROC 15

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Exposure estimation and reference to its source

Environment
PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 4.28E-3 mg/l; RCR: 0.052
Fresh Water (Sediment)	PEC: 0.017 mg/kg dw; RCR: 0.052
Marine Water (Pelagic)	PEC: 4.89E-4 mg/l; RCR: 0.06
Marine Water (Sediment)	PEC: 1.93E-3 mg/kg dw; RCR: 0.06
Agricultural Soil	PEC: 6.58E-4 mg/kg dw; RCR: 0.04
Sewage Treatment Plant (Effluent)	PEC: 4.17E-5 mg/l; RCR: < 0.01

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.031
Proc 2	EE(inhal): 15.44

Proc 3	EE(inhal): 30.88
Proc 4	EE(inhal): 61.77
Proc 5	EE(inhal): 15.44
Proc 8a	EE(inhal): 15.44
Proc 8b	EE(inhal): 3.861
Proc 9	EE(inhal): 15.44
Proc 15	EE(inhal): 30.88

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 1	RCR(inhal): < 0.01
Proc 2	RCR(inhal): 0.05
Proc 3	RCR(inhal): 0.1
Proc 4	RCR(inhal): 0.199
Proc 5	RCR(inhal): 0.05
Proc 8a	RCR(inhal): 0.05
Proc 8b	RCR(inhal): 0.012
Proc 9	RCR(inhal): 0.05
Proc 15	RCR(inhal): 0.1

Number of the ES 3

Short title of the exposure scenario
Distribution of substance

List of use descriptors

Sector of uses [SU]
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites
SU8: Manufacture of bulk, large scale chemicals (including petroleum products)
SU9: Manufacture of fine chemicals

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC15: Use as laboratory reagent

Environmental release categories [ERC]
ERC2: Formulation of preparations (mixtures)

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
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.

Further explanations
Industrial use
Assessment tool used:
Chesar 3.2
liquid
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently)
Assumes an advanced standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario **1**
Contributing exposure scenario controlling environmental exposure for
ERC 2

Further specification
Specific Environmental Release Categories [SPERC], SpERC ESVOC 1.1b.v1 (ESVOC 3), release factors for (Sp)ERC were modified.
Amounts used
Daily amount per site: 0.13 to
Annual amount per site: 197621 to
Fraction of EU tonnage used in region: 1
Other given operational conditions affecting environmental exposure
Indoor/Outdoor use
Technical conditions and measures at process level (source) to prevent release
Release fraction to wastewater from process: 1E-3%
Release fraction to soil from process: 1E-3%
Release fraction to air from process: 0.01%
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Onsite treatment off-air. Apply vapour recovery (Adsorption, …). Assumed Efficiency: 90 % Typical measures to maintain workplace concentrations or airborne VOCs and particulates below respective OELS.
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m^3/d): 2000
Water flow in sewage/river (m^3/day): 18000
The minimum grade of elimination in the sewage plant is (%): 87.45

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for
PROC 1

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **3**
Contributing exposure scenario controlling worker exposure for
PROC 2

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for

PROC 3

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for
PROC 4

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **6**
Contributing exposure scenario controlling worker exposure for
PROC 8a

Frequency and duration of use
4 h (half shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **7**
Contributing exposure scenario controlling worker exposure for
PROC 8b

Frequency and duration of use
4 h (half shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **8**
Contributing exposure scenario controlling worker exposure for
PROC 9

Frequency and duration of use
4 h (half shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **9**
Contributing exposure scenario controlling worker exposure for
PROC 15

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure

Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Exposure estimation and reference to its source

Environment
PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 4.29E-3 mg/l; RCR: 0.052
Fresh Water (Sediment)	PEC: 0.017 mg/kg dw; RCR: 0.052
Marine Water (Pelagic)	PEC: 4.89E-4 mg/l; RCR: 0.06
Marine Water (Sediment)	PEC: 1.93E-3 mg/kg dw; RCR: 0.06
Agricultural Soil	PEC: 2.22E-3 mg/kg dw; RCR: 0.133
Sewage Treatment Plant (Effluent)	PEC: 8.27E-5 mg/l; RCR: < 0.01

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.031
Proc 2	EE(inhal): 61.77
Proc 3	EE(inhal): 77.21
Proc 4	EE(inhal): 154.4
Proc 8a	EE(inhal): 185.3
Proc 8b	EE(inhal): 92.65
Proc 9	EE(inhal): 185.3
Proc 15	EE(inhal): 30.88

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 1	RCR(inhal): < 0.01
Proc 2	RCR(inhal): 0.199
Proc 3	RCR(inhal): 0.249
Proc 4	RCR(inhal): 0.498
Proc 8a	RCR(inhal): 0.598
Proc 8b	RCR(inhal): 0.299
Proc 9	RCR(inhal): 0.598
Proc 15	RCR(inhal): 0.1

Number of the ES 4

Short title of the exposure scenario
Uses in coatings

List of use descriptors

Sector of uses [SU]
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure

PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC7: Industrial spraying
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10: Roller application or brushing
PROC13: Treatment of articles by dipping and pouring
PROC15: Use as laboratory reagent

Environmental release categories [ERC]
ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Covers the use in coatings (paints, inks, adhesives, etc) within closed or contained systems including incidental exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application activities and film formation) and equipment cleaning, maintenance and associated laboratory activities.

Further explanations
Industrial use
Assessment tool used:
Chesar 3.2
StoffenManager V 6 for Following PROC:
PROC 7
liquid
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently)
Assumes an advanced standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario **1**
Contributing exposure scenario controlling environmental exposure for ERC 4

Further specification
release factors for (Sp)ERC were modified.
Amounts used
Daily amount per site: 46.0 to
Annual amount per site: 13804 to
Fraction of EU tonnage used in region: 1
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from process: 0.18 %
Release fraction to wastewater from process: 0 %
Release fraction to soil from process: 0%
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Onsite treatment off-air; Apply air filtration - particle removal. Assumed Efficiency: 95 %
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m^3/d): 2000
Water flow in sewage/river (m^3/day): 18000
The minimum grade of elimination in the sewage plant is (%): 87.45
Do not apply industrial sludge to natural soils

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for

PROC 1

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **3**
Contributing exposure scenario controlling worker exposure for
PROC 2

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for
PROC 3

Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
Area potentially exposed: corresponds to palm of 1 hand (240 cm^2)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for
PROC 4

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **6**
Contributing exposure scenario controlling worker exposure for
PROC 5

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **7**
Contributing exposure scenario controlling worker exposure for
PROC 7

Further specification
Assessment tool used: StoffenManager
Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume > 1000 m3
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Technical conditions and measures to control dispersion from source towards the worker
Use in ventilated spray booths only.
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly.

Number of the contributing scenario **8**
Contributing exposure scenario controlling worker exposure for
PROC 8a

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **9**
Contributing exposure scenario controlling worker exposure for
PROC 8b

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 95 % (inhalative).

Number of the contributing scenario **10**
Contributing exposure scenario controlling worker exposure for
PROC 9

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **11**
Contributing exposure scenario controlling worker exposure for
PROC 10

Product characteristics
Liquid, vapour pressure 0,5 - 10 kPa at STP
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure

Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario 12
Contributing exposure scenario controlling worker exposure for PROC 13

Product characteristics
Liquid, vapour pressure 0,5 - 10 kPa at STP
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario 13
Contributing exposure scenario controlling worker exposure for PROC 15

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Exposure estimation and reference to its source

Environment
PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 4.28E-3 mg/l; RCR: 0.052
Fresh Water (Sediment)	PEC: 0.017 mg/kg dw; RCR: 0.052
Marine Water (Pelagic)	PEC: 4.88E-4 mg/l; RCR: 0.06
Marine Water (Sediment)	PEC: 1.93E-3 mg/kg dw; RCR: 0.059
Agricultural Soil	PEC: 2.64E-3 mg/kg dw; RCR: 0.159
Sewage Treatment Plant (Effluent)	PEC: 0 mg/l; RCR: < 0.01

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.031
Proc 2	EE(inhal): 15.44
Proc 3	EE(inhal): 30.88
Proc 4	EE(inhal): 61.77
Proc 5	EE(inhal): 15.44
Proc 7	EE(inhal): 0
Proc 8a	EE(inhal): 15.44
Proc 8b	EE(inhal): 3.861
Proc 9	EE(inhal): 15.44
Proc 10	EE(inhal): 15.44
Proc 13	EE(inhal): 15.44
Proc 15	EE(inhal): 30.88

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 1	RCR(inhal): < 0.01
Proc 2	RCR(inhal): 0.05
Proc 3	RCR(inhal): 0.1
Proc 4	RCR(inhal): 0.199
Proc 5	RCR(inhal): 0.05
Proc 7	RCR(inhal): < 0.01
Proc 8a	RCR(inhal): 0.05
Proc 8b	RCR(inhal): 0.012
Proc 9	RCR(inhal): 0.05
Proc 10	RCR(inhal): 0.05
Proc 13	RCR(inhal): 0.05
Proc 15	RCR(inhal): 0.1

Number of the ES 5

Short title of the exposure scenario
Uses in coatings

List of use descriptors

Sector of uses [SU]
SU22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10: Roller application or brushing
PROC11: Non industrial spraying
PROC13: Treatment of articles by dipping and pouring
PROC15: Use as laboratory reagent
PROC19: Hand-mixing with intimate contact and only PPE available

Environmental release categories [ERC]
ERC8d: Wide dispersive outdoor use of processing aids in open systems

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Covers the use in coatings (paints, inks, adhesives, etc) within closed or contained systems including incidental exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application activities and film formation) and equipment cleaning, maintenance and associated laboratory activities.

Further explanations
Professional use
Assessment tool used:
Chesar 3.2
StoffenManager V 6 for Following PROC:
PROC 11
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently)
Assumes a basic standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario **1**
Contributing exposure scenario controlling environmental exposure for ERC 8d

Further specification
Specific Environmental Release Categories [SPERC], SpERC ESVOC 8.3b.v1.
Amounts used
daily wide dispersive use: 0.0042 to/d
Fraction of Regional tonnage used locally: 0.0005
Other given operational conditions affecting environmental exposure
Indoor/Outdoor use
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from process: 98 %
Release fraction to wastewater from process: 1 %
Release fraction to soil from process: 1%
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m^3/d): 2000
The minimum grade of elimination in the sewage plant is (%): 87.45
Conditions and measures related to external treatment of waste for disposal
Dispose of waste product or used containers according to local regulations

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for PROC 1

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **3**
Contributing exposure scenario controlling worker exposure for PROC 2

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for PROC 3

Product characteristics

Liquid, vapour pressure 0,5 - 10 kPa at STP
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for PROC 4

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **6**
Contributing exposure scenario controlling worker exposure for PROC 5

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use

Number of the contributing scenario **7**
Contributing exposure scenario controlling worker exposure for PROC 8a

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **8**
Contributing exposure scenario controlling worker exposure for PROC 8b

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **9**
Contributing exposure scenario controlling worker exposure for PROC 9

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker

provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **10**
Contributing exposure scenario controlling worker exposure for PROC 10

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **11**
Contributing exposure scenario controlling worker exposure for PROC 11

Further specification
Assessment tool used: StoffenManager
Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume > 1000 m3
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Technical conditions and measures to control dispersion from source towards the worker
Use in ventilated spray booths only.
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly.

Number of the contributing scenario **12**
Contributing exposure scenario controlling worker exposure for PROC 11

Further specification
Assessment tool used: StoffenManager
Frequency and duration of use
Exposure time per day: 6 h/d
Other given operational conditions affecting workers exposure
Indoor use
Room volume 100 - 1000 m3
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Ensure that the task is not carried out by more than one worker simultaneously.
Technical conditions and measures to control dispersion from source towards the worker
Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 47 % (inhalative).
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly.

Number of the contributing scenario **13**
Contributing exposure scenario controlling worker exposure for PROC 11

Further specification
Assessment tool used: StoffenManager
Frequency and duration of use

8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume < 100 m3
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Ensure that the task is not carried out by more than one worker simultaneously.
Technical conditions and measures to control dispersion from source towards the worker
Provide enhanced general ventilation by mechanical means. Effectiveness of LEV (local exhaust ventilation): 47 % (inhalative).
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Wear respiratory protection (Efficiency: 80 %) Alternatively: Use duration max. 5 h. Inspect and clean equipment regularly.

Number of the contributing scenario 14
Contributing exposure scenario controlling worker exposure for PROC 13

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario 15
Contributing exposure scenario controlling worker exposure for PROC 15

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario 16
Contributing exposure scenario controlling worker exposure for PROC 19

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Exposure estimation and reference to its source

Environment
PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 4.54E-3 mg/l; RCR: 0.055
Fresh Water (Sediment)	PEC: 0.018 mg/kg dw; RCR: 0.055
Marine Water (Pelagic)	PEC: 5.15E-4 mg/l; RCR: 0.063
Marine Water (Sediment)	PEC: 2.03E-3 mg/kg dw; RCR: 0.063
Agricultural Soil	PEC: 5.92E-4 mg/kg dw; RCR: 0.036
Sewage Treatment Plant (Effluent)	PEC: 2.66E-3 mg/l; RCR: < 0.01

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.031
Proc 2	EE(inhal): 61.77
Proc 3	EE(inhal): 77.21
Proc 4	EE(inhal): 154.4
Proc 5	EE(inhal): 185.3
Proc 8a	EE(inhal): 185.3
Proc 8b	EE(inhal): 92.65
Proc 9	EE(inhal): 185.3
Proc 10	EE(inhal): 185.3
Proc 11	EE(inhal): 0 - Contributing Scenario 11
	EE(inhal): 300 - Contributing Scenario 12
	EE(inhal): 187.5 - Contributing Scenario 13
Proc 13	EE(inhal): 185.3
Proc 15	EE(inhal): 30.88
Proc 19	EE(inhal): 185.3

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 1	RCR(inhal): < 0.01
Proc 2	RCR(inhal): 0.199
Proc 3	RCR(inhal): 0.249
Proc 4	RCR(inhal): 0.498
Proc 5	RCR(inhal): 0.598
Proc 8a	RCR(inhal): 0.598
Proc 8b	RCR(inhal): 0.299
Proc 9	RCR(inhal): 0.598
Proc 10	RCR(inhal): 0.598
Proc 11	RCR(inhal): < 0.01 - Contributing Scenarios 11
	RCR(inhal): 0.968 - Contributing Scenarios 12
	RCR(inhal): 0.605 - Contributing Scenarios 13
Proc 13	RCR(inhal): 0.598
Proc 15	RCR(inhal): 0.1
Proc 19	RCR(inhal): 0.598

Number of the ES 6

Short title of the exposure scenario
Use in Cleaning Products

List of use descriptors

Sector of uses [SU]
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC7: Industrial spraying

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10: Roller application or brushing
PROC13: Treatment of articles by dipping and pouring

Environmental release categories [ERC]
ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Covers the use as a component of cleaning products including transfer from storage, pouring/unloading from drums or containers. exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping, automated and by hand), related equipment cleaning and maintenance.

Further explanations
Industrial use
Assessment tool used:
Chesar 3.2
StoffenManager V 6 for Following PROC:
PROC 7
liquid
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently).
Assumes an advanced standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario **1**
Contributing exposure scenario controlling environmental exposure for ERC 4

Further specification
SpERC ESVOC 4.4a.v1 (ESVOC 8), Specific Environmental Release Categories [SPERC], release factors for (Sp)ERC were modified.
Amounts used
Daily amount per site: 106.8 to
Annual amount per site: 2136 to
Other given operational conditions affecting environmental exposure
Indoor use
Technical conditions and measures at process level (source) to prevent release
Release fraction to wastewater from process: 3E-3%
Release fraction to soil from process: 0%
Release fraction to air from process: 0.1%
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Onsite treatment off-air. Upgrade Systems in place or implement addional treatment. Assumed Efficiency: 99.9 % Typical measures to maintain workplace concentrations of airborne VOCs and particulates below respective OELs: e.g. thermal wet scrubber, gas removal and/or air filtration, particle removal and/or thermal oxidation and/or vapour recovery, adsorption. Onsite treatment wastewater. Apply acclimated biological treatment. Assumed Efficiency: 70 %
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m^3/d): 2000
Water flow in sewage/river (m^3/day): 18000
The minimum grade of elimination in the sewage plant is (%): 87.45

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for PROC 1

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **3**
Contributing exposure scenario controlling worker exposure for
PROC 2

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for
PROC 3

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for
PROC 4

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **6**
Contributing exposure scenario controlling worker exposure for
PROC 7

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume > 1000 m3
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Technical conditions and measures to control dispersion from source towards the worker
Use in ventilated spray booths only.
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly.

Number of the contributing scenario **7**
Contributing exposure scenario controlling worker exposure for

PROC 8a

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **8**
Contributing exposure scenario controlling worker exposure for
PROC 8b

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 95 % (inhalative).

Number of the contributing scenario **9**
Contributing exposure scenario controlling worker exposure for
PROC 9

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **10**
Contributing exposure scenario controlling worker exposure for
PROC 10

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **11**
Contributing exposure scenario controlling worker exposure for
PROC 13

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Exposure estimation and reference to its source

Environment
PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 0.024 mg/l; RCR: 0.297
Fresh Water (Sediment)	PEC: 0.096 mg/kg dw; RCR: 0.297
Marine Water (Pelagic)	PEC: 2.5E-3 mg/l; RCR: 0.305
Marine Water (Sediment)	PEC: 9.87E-3 mg/kg dw; RCR: 0.304
Agricultural Soil	PEC: 7.52E-4 mg/kg dw; RCR: 0.045
Sewage Treatment Plant (Effluent)	PEC: < 0.01 mg/l; RCR: 0.0001

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.031
Proc 2	EE(inhal): 15.44
Proc 3	EE(inhal): 30.88
Proc 4	EE(inhal): 61.77
Proc 7	EE(inhal): 0
Proc 8a	EE(inhal): 15.44
Proc 8b	EE(inhal): 3.861
Proc 9	EE(inhal): 15.44
Proc 10	EE(inhal): 15.44
Proc 13	EE(inhal): 15.44

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 1	RCR(inhal): < 0.01
Proc 2	RCR(inhal): 0.05
Proc 3	RCR(inhal): 0.1
Proc 4	RCR(inhal): 0.199
Proc 7	RCR(inhal): < 0.01
Proc 8a	RCR(inhal): 0.05
Proc 8b	RCR(inhal): 0.012
Proc 9	RCR(inhal): 0.05
Proc 10	RCR(inhal): 0.05
Proc 13	RCR(inhal): 0.05

Number of the ES 7

Short title of the exposure scenario
Use in Cleaning Products

List of use descriptors

Sector of uses [SU]
SU22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated

facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10: Roller application or brushing
PROC11: Non industrial spraying
PROC13: Treatment of articles by dipping and pouring

Environmental release categories [ERC]
ERC8d: Wide dispersive outdoor use of processing aids in open systems

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Covers the use as a component of cleaning products including pouring/unloading from drums or containers; and exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping, automated and by hand).

Further explanations
Professional use
Assessment tool used:
Chesar 3.2
StoffenManager V 6 for Following PROC:
PROC 11
liquid
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently)
Assumes a basic standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario **1**
Contributing exposure scenario controlling environmental exposure for ERC 8d

Further specification
Specific Environmental Release Categories [SPERC], SpERC ESVOC 8.4b.v1 (ESVOC 9).
Amounts used
daily wide dispersive use: 0.0004 to/d
Frequency and duration of use
Covers use up to: 365 days
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from process: 98%
Release fraction to wastewater from process: 1%
Release fraction to soil from process: 1%
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m^3/d): 2000
The minimum grade of elimination in the sewage plant is (%): 87.45

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for PROC 1

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **3**

Contributing exposure scenario controlling worker exposure for PROC 2

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for PROC 3

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for PROC 4

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **6**
Contributing exposure scenario controlling worker exposure for PROC 8a

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **7**
Contributing exposure scenario controlling worker exposure for PROC 8b

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **8**
Contributing exposure scenario controlling worker exposure for PROC 9

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours

Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **9**
Contributing exposure scenario controlling worker exposure for
PROC 10

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **10**
Contributing exposure scenario controlling worker exposure for
PROC 11

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume > 1000 m3
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Technical conditions and measures to control dispersion from source towards the worker
Use in ventilated spray booths only.
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly.

Number of the contributing scenario **11**
Contributing exposure scenario controlling worker exposure for
PROC 11

Frequency and duration of use
Exposure time per day: 6 h/d
Other given operational conditions affecting workers exposure
Indoor use
Room volume 100 - 1000 m3
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Technical conditions and measures to control dispersion from source towards the worker
Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 47 % (inhalative).
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly.

Number of the contributing scenario **12**
Contributing exposure scenario controlling worker exposure for
PROC 11

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume < 100 m³

Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Ensure that the task is not carried out by more than one worker simultaneously.
Technical conditions and measures to control dispersion from source towards the worker
Provide enhanced general ventilation by mechanical means. Effectiveness of LEV (local exhaust ventilation): 47 % (inhalative).
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Wear respiratory protection (Efficiency: 80 %) Alternatively: Use duration max. 5 h. Inspect and clean equipment regularly.

Number of the contributing scenario 13
Contributing exposure scenario controlling worker exposure for PROC 13

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Exposure estimation and reference to its source

Environment
PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 4.3E-3 mg/l; RCR: 0.052
Fresh Water (Sediment)	PEC: 0.017 mg/kg dw; RCR: 0.052
Marine Water (Pelagic)	PEC: 4.91E-4 mg/l; RCR: 0.06
Marine Water (Sediment)	PEC: 1.94E-3 mg/kg dw; RCR: 0.06
Agricultural Soil	PEC: 5.77E-4 mg/kg dw; RCR: 0.035
Sewage Treatment Plant (Effluent)	PEC: 2.49E-4 mg/l; RCR: < 0.01

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.031
Proc 2	EE(inhal): 61.75
Proc 3	EE(inhal): 77.21
Proc 4	EE(inhal): 154.4
Proc 8a	EE(inhal): 185.3
Proc 8b	EE(inhal): 92.65
Proc 9	EE(inhal): 185.3
Proc 10	EE(inhal): 185.3
Proc 11	EE(inhal): 0 - Contributing Scenario 10 EE(inhal): 300 - Contributing Scenario 11 EE(inhal): 187.5 - Contributing Scenario 12
Proc 13	EE(inhal): 185.3

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 1	RCR(inhal): < 0.01
Proc 2	RCR(inhal): 0.199
Proc 3	RCR(inhal): 0.249
Proc 4	RCR(inhal): 0.498

Proc 8a	RCR(inhal): 0.598
Proc 8b	RCR(inhal): 0.299
Proc 9	RCR(inhal): 0.598
Proc 10	RCR(inhal): 0.598
Proc 11	RCR(inhal): 0 - Contributing Scenarios 10
	RCR(inhal): 0.968 - Contributing Scenarios 11
	RCR(inhal): 0.605 - Contributing Scenarios 12
Proc 13	RCR(inhal): 0.598

Number of the ES 8

Short title of the exposure scenario

Lubricants

List of use descriptors

Sector of uses [SU]
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC7: Industrial spraying
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10: Roller application or brushing
PROC13: Treatment of articles by dipping and pouring
PROC17: Lubrication at high energy conditions and in partly open process
PROC18: Greasing at high energy conditions

Environmental release categories [ERC]
ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Covers the use of formulated lubricants in closed and open systems including transfer operations, operation of machinery/engines and similar articles, reworking on reject articles, equipment maintenance and disposal of wastes.

Further explanations
Industrial use
Assessment tool used:
Chesar 3.2
StoffenManager V 6 for Following PROC:
liquid
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently)
Assumes an advanced standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario **1**

Contributing exposure scenario controlling environmental exposure for ERC 4

Further specification
release factors for (Sp)ERC were modified, A&B Tables: A3.8, B3.7.
Amounts used
Daily amount per site: 1.45 to
Annual amount per site: 506 to
Fraction of EU tonnage used in region: 1
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from process: 0.5 %
Release fraction to wastewater from process: 0.05 %
Release fraction to soil from process: 0.1%
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m^3/d): 2000
Water flow in sewage/river (m^3/day): 18000
The minimum grade of elimination in the sewage plant is (%): 87.45

Number of the contributing scenario 2
Contributing exposure scenario controlling worker exposure for PROC 1

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario 3
Contributing exposure scenario controlling worker exposure for PROC 2

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario 4
Contributing exposure scenario controlling worker exposure for PROC 3

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario 5
Contributing exposure scenario controlling worker exposure for PROC 4

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker

provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario	**6**
Contributing exposure scenario controlling worker exposure for	
PROC 7	

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Room volume > 1000 m³
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Technical conditions and measures to control dispersion from source towards the worker
Use in ventilated spray booths only.
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly.

Number of the contributing scenario	**7**
Contributing exposure scenario controlling worker exposure for	
PROC 8a	

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario	**8**
Contributing exposure scenario controlling worker exposure for	
PROC 8b	

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 95 % (inhalative).

Number of the contributing scenario	**9**
Contributing exposure scenario controlling worker exposure for	
PROC 9	

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario	**10**
Contributing exposure scenario controlling worker exposure for	
PROC 10	

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **11**
Contributing exposure scenario controlling worker exposure for
PROC 13

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **12**
Contributing exposure scenario controlling worker exposure for
PROC 17

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **13**
Contributing exposure scenario controlling worker exposure for
PROC 17

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Operation is carried out at elevated temperature (> 20°C above ambient temperature)
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **14**
Contributing exposure scenario controlling worker exposure for
PROC 18

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **15**
Contributing exposure scenario controlling worker exposure for
PROC 18

Frequency and duration of use

8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Operation is carried out at elevated temperature (> 20°C above ambient temperature)
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Exposure estimation and reference to its source

Environment
PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 8.82E-3 mg/l; RCR: 0.107
Fresh Water (Sediment)	PEC: 0.035 mg/kg dw; RCR: 0.107
Marine Water (Pelagic)	PEC: 9.42E-4 mg/l; RCR: 0.115
Marine Water (Sediment)	PEC: 3.72E-3 mg/kg dw; RCR: 0.115
Agricultural Soil	PEC: 1.06E-3 mg/kg dw; RCR: 0.064
Sewage Treatment Plant (Effluent)	PEC: 0.045 mg/l; RCR: < 0.01

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.031
Proc 2	EE(inhal): 15.44
Proc 3	EE(inhal): 30.88
Proc 4	EE(inhal): 61.77
Proc 7	EE(inhal): 0
Proc 8a	EE(inhal): 15.44
Proc 8b	EE(inhal): 3.861
Proc 9	EE(inhal): 15.44
Proc 10	EE(inhal): 15.44
Proc 13	EE(inhal): 15.44
Proc 17	EE(inhal): 154.4 - Contributing Scenario 12
	EE(inhal): 30.88 - Contributing Scenario 13
Proc 18	EE(inhal): 154.4 - Contributing Scenario 14
	EE(inhal): 30.88 - Contributing Scenario 15

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 1	RCR(inhal): < 0.01
Proc 2	RCR(inhal): 0.05
Proc 3	RCR(inhal): 0.1
Proc 4	RCR(inhal): 0.199
Proc 7	RCR(inhal): < 0.01
Proc 8a	RCR(inhal): 0.05
Proc 8b	RCR(inhal): 0.012
Proc 9	RCR(inhal): 0.05
Proc 10	RCR(inhal): 0.05
Proc 13	RCR(inhal): 0.05
Proc 17	RCR(inhal): 0.498 - Contributing Scenarios 12
	RCR(inhal): 0.1 - Contributing Scenarios 13
Proc 18	RCR(inhal): 0.498 - Contributing Scenarios 14
	RCR(inhal): 0.1 - Contributing Scenarios 15

Number of the ES 9

Short title of the exposure scenario
Lubricants

List of use descriptors

Sector of uses [SU]
SU22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10: Roller application or brushing
PROC11: Non industrial spraying
PROC13: Treatment of articles by dipping and pouring
PROC17: Lubrication at high energy conditions and in partly open process
PROC18: Greasing at high energy conditions
PROC20: Heat and pressure transfer fluids in dispersive, professional use but closed systems

Environmental release categories [ERC]
ERC9b: Wide dispersive outdoor use of substances in closed systems

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Covers the use of formulated lubricants in closed and open systems including transfer operations, operation of engines and similar articles, reworking on reject articles, equipment maintenance and disposal of waste oil.

Further explanations
Professional use
Assessment tool used:
Chesar 3.2
StoffenManager V 6 for Following PROC:
PROC 11
liquid
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently)
Assumes a basic standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario 1
Contributing exposure scenario controlling environmental exposure for ERC 9b

Further specification
Specific Environmental Release Categories [SPERC], SpERC ESVOC 9.6b.v1 (ESVOC 14), SpERC ESVOC 9.6d.v1 (ESVOC 16).
Amounts used
daily wide dispersive use: 0.000051 to/d
Fraction of EU tonnage used in region: 0.0000512

Fraction of Regional tonnage used locally: 0.0000513
Frequency and duration of use
Covers use up to: 365 days
Other given operational conditions affecting environmental exposure
Indoor/Outdoor use
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from wide dispersive use (regional only): 1 %
Release fraction to wastewater from wide dispersive use: 1 %
Release fraction to soil from wide dispersive use (regional only): 1%
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m^3/d): 2000
The minimum grade of elimination in the sewage plant is (%): 87.45

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for
PROC 1

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **3**
Contributing exposure scenario controlling worker exposure for
PROC 2

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for
PROC 3

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for
PROC 4

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **6**
Contributing exposure scenario controlling worker exposure for
PROC 8a

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **7**
Contributing exposure scenario controlling worker exposure for
PROC 8b

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **8**
Contributing exposure scenario controlling worker exposure for
PROC 9

Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **9**
Contributing exposure scenario controlling worker exposure for
PROC 10

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **10**
Contributing exposure scenario controlling worker exposure for
PROC 11

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume > 1000 m3
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Technical conditions and measures to control dispersion from source towards the worker
Use in ventilated spray booths only.
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly.

Number of the contributing scenario **11**
Contributing exposure scenario controlling worker exposure for
PROC 11

Frequency and duration of use
Exposure time per day: 6 h/d
Other given operational conditions affecting workers exposure
Indoor use
Room volume 100 - 1000 m3
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Ensure that the task is not carried out by more than one worker simultaneously.
Technical conditions and measures to control dispersion from source towards the worker
Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 47 % (inhalative).
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly.

Number of the contributing scenario 12
Contributing exposure scenario controlling worker exposure for PROC 11

Product characteristics
Liquid, vapour pressure 0,5 - 10 kPa at STP
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume < 100 m3
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Ensure that the task is not carried out by more than one worker simultaneously.
Technical conditions and measures to control dispersion from source towards the worker
Provide enhanced general ventilation by mechanical means. Effectiveness of LEV (local exhaust ventilation): 47 % (inhalative).
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly. Wear respiratory protection (Efficiency: 80 %) Alternatively: Use duration max. 5 h.

Number of the contributing scenario 13
Contributing exposure scenario controlling worker exposure for PROC 13

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario 14
Contributing exposure scenario controlling worker exposure for PROC 17

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation

Wear respiratory protection (Efficiency: 90 %) Alternatively: Use duration max. 1 h.

Number of the contributing scenario	**15**
Contributing exposure scenario controlling worker exposure for PROC 17	

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor use
Operation is carried out at elevated temperature (> 20°C above ambient temperature)
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 80 % (inhalative).
Conditions and measures related to personal protection, hygiene and health evaluation
If above technical/organisational control measures are not feasible, then adopt following PPE. If carried out for more than 1h, wear respiratory protection (efficiency 90%).

Number of the contributing scenario	**16**
Contributing exposure scenario controlling worker exposure for PROC 18	

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 80 % (inhalative). If no adequate ventilation is available, avoid carrying out operations for more than 1 h.

Number of the contributing scenario	**17**
Contributing exposure scenario controlling worker exposure for PROC 18	

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor use
Operation is carried out at elevated temperature (> 20°C above ambient temperature)
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 80 % (inhalative).
Conditions and measures related to personal protection, hygiene and health evaluation
If above technical/organisational control measures are not feasible, then adopt following PPE. If carried out for more than 1h, wear respiratory protection (efficiency 90%).

Number of the contributing scenario	**18**
Contributing exposure scenario controlling worker exposure for PROC 20	

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Exposure estimation and reference to its source

Environment
PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 4.28E-3 mg/l; RCR: 0.052
Fresh Water (Sediment)	PEC: 0.017 mg/kg dw; RCR: 0.052
Marine Water (Pelagic)	PEC: 4.88E-4 mg/l; RCR: 0.06
Marine Water (Sediment)	PEC: 1.93E-3 mg/kg dw; RCR: 0.06
Agricultural Soil	PEC: 5.76E-4 mg/kg dw; RCR: 0.035
Sewage Treatment Plant (Effluent)	PEC: 3.21E-5 mg/l; RCR: < 0.01

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.031
Proc 2	EE(inhal): 61.77
Proc 3	EE(inhal): 77.21
Proc 4	EE(inhal): 154.4
Proc 8a	EE(inhal): 185.3
Proc 8b	EE(inhal): 92.65
Proc 9	EE(inhal): 185.3
Proc 10	EE(inhal): 185.3
Proc 11	EE(inhal): 0 - Contributing Scenario 10
	EE(inhal): 300 - Contributing Scenario 11
	EE(inhal): 187.50 - Contributing Scenario 12
Proc 13	EE(inhal): 185.3
Proc 17	EE(inhal): 185.3 - Contributing Scenario 14
	EE(inhal): 123.5 - Contributing Scenario 15
Proc 18	EE(inhal): 123.5 - Contributing Scenario 16
	EE(inhal): 185.3 - Contributing Scenario 17
Proc 20	EE(inhal): 61.77

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 1	RCR(inhal): < 0.01
Proc 2	RCR(inhal): 0.199
Proc 3	RCR(inhal): 0.249
Proc 4	RCR(inhal): 0.498
Proc 8a	RCR(inhal): 0.598
Proc 8b	RCR(inhal): 0.299
Proc 9	RCR(inhal): 0.598
Proc 10	RCR(inhal): 0.598
Proc 11	RCR(inhal): < 0.01 - Contributing Scenarios 10
	RCR(inhal): 0.968 - Contributing Scenarios 11
	RCR(inhal): 0.605 - Contributing Scenarios 12
Proc 13	RCR(inhal): 0.598
Proc 17	RCR(inhal): 0.598 - Contributing Scenarios 14
	RCR(inhal): 0.399 - Contributing Scenarios 15
Proc 18	RCR(inhal): 0.399 - Contributing Scenarios 16
	RCR(inhal): 0.598 - Contributing Scenarios 17
Proc 20	RCR(inhal): 0.199

Number of the ES 10

Short title of the exposure scenario
Metal working fluids / rolling oils

List of use descriptors

Sector of uses [SU]
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC7: Industrial spraying
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10: Roller application or brushing
PROC13: Treatment of articles by dipping and pouring
PROC17: Lubrication at high energy conditions and in partly open process

Environmental release categories [ERC]
ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Covers the use in formulated MWFs (MWFs) including transfer operations, open and contained cutting/machining activities, automated and manual application of corrosion protections, draining and working on contaminated/ reject articles, and disposal of waste oils.

Further explanations
Industrial use
Assessment tool used:
Chesar 3.2
StoffenManager V 6 for Following PROC:
PROC 7
liquid
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently)
Assumes an advanced standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario **1**
Contributing exposure scenario controlling environmental exposure for ERC 4

Further specification
Specific Environmental Release Categories [SPERC], SpERC ESVOC 4.7a.v1 (ESVOC 18), release factors for (Sp)ERC were modified.
Amounts used
Daily amount per site: 2 to
Annual amount per site: 40 to
Fraction of EU tonnage used in region: 1
Technical conditions and measures at process level (source) to prevent release
Release fraction to wastewater from process: 0.03 %

Release fraction to soil from process: 0%
Release fraction to air from process: 0.6 %
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Onsite treatment off-air. Upgrade Systems in place or implement addional treatment. Assumed Efficiency: 70 % Onsite treatment wastewater. Apply acclimated biological treatment. Assumed Efficiency: 70 %
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m³/d): 2000
The minimum grade of elimination in the sewage plant is (%): 87.45
Water flow in sewage/river (m³/day): 18000
Conditions and measures related to external treatment of waste for disposal
Dispose of waste product or used containers according to local regulations

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for
PROC 1

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **3**
Contributing exposure scenario controlling worker exposure for
PROC 2

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for
PROC 3

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for
PROC 5

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **6**
Contributing exposure scenario controlling worker exposure for
PROC 7

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume > 1000 m³
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Technical conditions and measures to control dispersion from source towards the worker
Use in ventilated spray booths only.
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly.

Number of the contributing scenario **7**
Contributing exposure scenario controlling worker exposure for PROC 8a

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **9**
Contributing exposure scenario controlling worker exposure for PROC 8b

Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
Area potentially exposed: corresponds to 2 hands (960 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 95 % (inhalative).

Number of the contributing scenario **10**
Contributing exposure scenario controlling worker exposure for PROC 9

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **11**
Contributing exposure scenario controlling worker exposure for PROC 10

Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
Area potentially exposed: corresponds to 2 hands (960 cm²)

Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario 12
Contributing exposure scenario controlling worker exposure for PROC 13

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario 13
Contributing exposure scenario controlling worker exposure for PROC 17

Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
Area potentially exposed: corresponds to 2 hands (960 cm^2)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario 14
Contributing exposure scenario controlling worker exposure for PROC 17

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Operation is carried out at elevated temperature (> 20°C above ambient temperature)
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear respiratory protection (Efficiency: 95 %).

Exposure estimation and reference to its source

Environment
PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 8.04E-3 mg/l; RCR: 0.098
Fresh Water (Sediment)	PEC: 0.032 mg/kg dw; RCR: 0.098
Marine Water (Pelagic)	PEC: 8.65E-4 mg/l; RCR: 0.106
Marine Water (Sediment)	PEC: 3.41E-3 mg/kg dw; RCR: 0.105
Agricultural Soil	PEC: 8.25E-4 mg/kg dw; RCR: 0.05
Sewage Treatment Plant (Effluent)	PEC: 0.038 mg/l; RCR: < 0.01

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m^3]. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.031
Proc 2	EE(inhal): 15.44
Proc 3	EE(inhal): 30.88
Proc 5	EE(inhal): 15.44
Proc 7	EE(inhal): 0
Proc 8a	EE(inhal): 15.44
Proc 8b	EE(inhal): 3.861
Proc 9	EE(inhal): 15.44
Proc 10	EE(inhal): 15.44
Proc 13	EE(inhal): 15.44
Proc 17	EE(inhal): 154.38 - Contributing Scenario 13 EE(inhal): 15.44 - Contributing Scenario 14

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 1	RCR(inhal): < 0.01
Proc 2	RCR(inhal): 0.05
Proc 3	RCR(inhal): 0.1
Proc 5	RCR(inhal): 0.05
Proc 7	RCR(inhal): < 0.01
Proc 8a	RCR(inhal): 0.05
Proc 8b	RCR(inhal): 0.012
Proc 9	RCR(inhal): 0.05
Proc 10	RCR(inhal): 0.05
Proc 13	RCR(inhal): 0.05
Proc 17	RCR(inhal): 0.498 - Contributing Scenarios 13 RCR(inhal): 0.05 - Contributing Scenarios 14

Number of the ES 11

Short title of the exposure scenario
Metal working fluids / rolling oils

List of use descriptors

Sector of uses [SU]
SU22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC10: Roller application or brushing
PROC11: Non industrial spraying
PROC13: Treatment of articles by dipping and pouring
PROC17: Lubrication at high energy conditions and in partly open process

Environmental release categories [ERC]
ERC8a: Wide dispersive indoor use of processing aids in open systems

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Covers the use in formulated MWFs (MWFs) including transfer operations, open and contained cutting/machining activities, automated and manual application of corrosion protections, draining and working on contaminated/ reject articles, and disposal of waste oils.

Further explanations
Professional use
Chesar 3.2
Assessment tool used:
StoffenManager V 6 for Following PROC:
PROC 11
liquid
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently).
Assumes a basic standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario **1**
Contributing exposure scenario controlling environmental exposure for ERC 8a

Further specification
Specific Environmental Release Categories [SPERC], SpERC ESVOC 8.7c.v1 (ESVOC 20).
Amounts used
daily wide dispersive use: 0.055 to/d
Fraction of Regional tonnage used locally: 0.0005
Frequency and duration of use
Covers use up to: 365 days
Other given operational conditions affecting environmental exposure
Indoor/Outdoor use
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from wide dispersive use (regional only): 40%
Release fraction to wastewater from wide dispersive use: 5%
Release fraction to soil from wide dispersive use (regional only): 5%
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m^3/d): 2000
The minimum grade of elimination in the sewage plant is (%): 87.45

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for PROC 1

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **3**
Contributing exposure scenario controlling worker exposure for PROC 2

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure

Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for
PROC 3

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for
PROC 5

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **6**
Contributing exposure scenario controlling worker exposure for
PROC 8a

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **7**
Contributing exposure scenario controlling worker exposure for
PROC 8b

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **8**
Contributing exposure scenario controlling worker exposure for
PROC 10

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **9**

Contributing exposure scenario controlling worker exposure for PROC 11

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume > 1000 m³
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Technical conditions and measures to control dispersion from source towards the worker
Use in ventilated spray booths only.
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly.

Number of the contributing scenario 10
Contributing exposure scenario controlling worker exposure for PROC 11

Frequency and duration of use
Exposure time per day: 6 h/d
Other given operational conditions affecting workers exposure
Indoor use
Room volume 100 - 1000 m3
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Ensure that the task is not carried out by more than one worker simultaneously.
Technical conditions and measures to control dispersion from source towards the worker
Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 47 % (inhalative).
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly.

Number of the contributing scenario 11
Contributing exposure scenario controlling worker exposure for PROC 11

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume < 100 m³
Ensure that the task is being carried out outside the breathing zone of a worker (distance head-product greater than 1m).
Ensure that the task is not carried out by more than one worker simultaneously.
Technical conditions and measures to control dispersion from source towards the worker
Provide enhanced general ventilation by mechanical means. Effectiveness of LEV (local exhaust ventilation): 47 % (inhalative).
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Ensure the ventilation system is regularly maintained and tested
Conditions and measures related to personal protection, hygiene and health evaluation
Inspect and clean equipment regularly. Wear respiratory protection (Efficiency: 80 %) Alternatively: Use duration max. 5 h.

Number of the contributing scenario 12
Contributing exposure scenario controlling worker exposure for PROC 13

Frequency and duration of use

Avoid carrying out activities involving exposure for more than 4 hours
Human factors not influenced by risk management
Area potentially exposed: corresponds to palm of 2 hands (480 cm^2)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario 13
Contributing exposure scenario controlling worker exposure for PROC 17

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear respiratory protection (Efficiency: 90 %) Alternatively: Use duration max. 1 h.

Number of the contributing scenario 14
Contributing exposure scenario controlling worker exposure for PROC 17

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Operation is carried out at elevated temperature (> 20°C above ambient temperature)
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Provide extract ventilation to points where emissions occur. Effectiveness of LEV (local exhaust ventilation): 80 % (inhalative).
Conditions and measures related to personal protection, hygiene and health evaluation
If above technical/organisational control measures are not feasible, then adopt following PPE. If carried out for more than 1h, wear respiratory protection (efficiency 90%).

Exposure estimation and reference to its source

Environment
PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 0.022 mg/l; RCR: 0.263
Fresh Water (Sediment)	PEC: 0.085 mg/kg dw; RCR: 0.262
Marine Water (Pelagic)	PEC: 2.21E-3 mg/l; RCR: 0.27
Marine Water (Sediment)	PEC: 8.74E-3 mg/kg dw; RCR: 0.27
Agricultural Soil	PEC: 1.63E-3 mg/kg dw; RCR: 0.098
Sewage Treatment Plant (Effluent)	PEC: 0.173 mg/l; RCR: < 0.01

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m^3]. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.031
Proc 2	EE(inhal): 61.77
Proc 3	EE(inhal): 77.21
Proc 5	EE(inhal): 185.3
Proc 8a	EE(inhal): 185.3
Proc 8b	EE(inhal): 92.65
Proc 10	EE(inhal): 185.3

Proc 11	EE(inhal): 0 - Contributing Scenario 9
	EE(inhal): 300 - Contributing Scenario 10
	EE(inhal): 187.4 - Contributing Scenario 11
Proc 13	EE(inhal): 185.3
Proc 17	EE(inhal): 123.5 - Contributing Scenario 13
	EE(inhal): 185.3 - Contributing Scenario 14

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 1	RCR(inhal): < 0.01
Proc 2	RCR(inhal): 0.199
Proc 3	RCR(inhal): 0.249
Proc 5	RCR(inhal): 0.598
Proc 8a	RCR(inhal): 0.598
Proc 8b	RCR(inhal): 0.299
Proc 10	RCR(inhal): 0.598
Proc 11	RCR(inhal): < 0.01 - Contributing Scenarios 9
	RCR(inhal): 0.968 - Contributing Scenarios 10
	RCR(inhal): 0.605 - Contributing Scenarios 11
Proc 13	RCR(inhal): 0.598
Proc 17	RCR(inhal): 0.399 - Contributing Scenarios 13
	RCR(inhal): 0.598 - Contributing Scenarios 14

Number of the ES 12

Short title of the exposure scenario

Use in laboratories

List of use descriptors

Sector of uses [SU]
SU22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Process categories [PROC]
PROC10: Roller application or brushing
PROC15: Use as laboratory reagent

Environmental release categories [ERC]
ERC8a: Wide dispersive indoor use of processing aids in open systems

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Use of small quantities within laboratory settings, including material transfers and equipment cleaning

Further explanations
Professional use
Assessment tool used:
Chesar 3.2
liquid
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently)
Assumes a basic standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario **1**
Contributing exposure scenario controlling environmental exposure for ERC 8a

Further specification
Specific Environmental Release Categories [SPERC], SpERC ESVOC 8.17.v1 (ESVOC 39).
Amounts used
daily wide dispersive use: 0.0000088 to/d
Fraction of Regional tonnage used locally: 0.00000883
Frequency and duration of use
Covers use up to: 365 days
Other given operational conditions affecting environmental exposure
Indoor/Outdoor use
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from process: 50 %
Release fraction to wastewater from process: 50 %
Release fraction to soil from process: 0%
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m^3/d): 2000
The minimum grade of elimination in the sewage plant is (%): 87.45

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for PROC 10

Frequency and duration of use
Avoid carrying out activities involving exposure for more than 4 hours
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **3**
Contributing exposure scenario controlling worker exposure for PROC 15

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Exposure estimation and reference to its source

Environment

PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 4.31E-3 mg/l; RCR: 0.053
Fresh Water (Sediment)	PEC: 0.017 mg/kg dw; RCR: 0.052
Marine Water (Pelagic)	PEC: 4.91E-4 mg/l; RCR: 0.06
Marine Water (Sediment)	PEC: 1.94E-3 mg/kg dw; RCR: 0.06
Agricultural Soil	PEC: 5.77E-4 mg/kg dw; RCR: 0.035
Sewage Treatment Plant (Effluent)	PEC: 2.76E-4 mg/l; RCR: < 0.01

Human exposure prediction (oral, dermal, inhalative)

Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 10	EE(inhal): 185.3
Proc 15	EE(inhal): 30.88

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 10	RCR(inhal): 0.598
Proc 15	RCR(inhal): 0.1

Number of the ES 13

Short title of the exposure scenario
Polymer processing

List of use descriptors

Sector of uses [SU]
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Environmental release categories [ERC]
ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Processing of formulated polymers including material transfers, moulding and forming activities, material re-works and associated maintenance

Further explanations
Industrial use
Assessment tool used:
Chesar 3.2
liquid
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Covers percentage substance in the product up to 100 % (unless stated differently)
Assumes an advanced standard of occupational Health and Safety Management System

Contributing Scenarios

Number of the contributing scenario 1
Contributing exposure scenario controlling environmental exposure for

ERC 4

Further specification
Specific Environmental Release Categories [SPERC], SpERC ESVOC 4.21a.v1 (ESVOC 44).
Amounts used
Daily amount per site: 2 to
Annual amount per site: 600 to
Fraction of EU tonnage used in region: 1
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from process: 5 %
Release fraction to wastewater from process: 0 %
Release fraction to soil from process: 0.001%
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Onsite treatment off-air. Upgrade Systems in place or implement addional treatment. Assumed Efficiency: 80 % Onsite treatment wastewater. Apply acclimated biological treatment. Assumed Efficiency: 70 % Typical measures to maintain workplace concentrations of airborne VOCs and particulates below respective OELs: e.g. thermal wet scrubber, gas removal and/or air filtration, particle removal and/or thermal oxidation and/or vapour recovery, adsorption.
Conditions and measures related to municipal sewage treatment plant
Size of municipal sewage system/ treatment plant (m^3/d): 2000
The minimum grade of elimination in the sewage plant is (%): 87.45

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for PROC 1

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **3**
Contributing exposure scenario controlling worker exposure for PROC 2

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for PROC 3

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for PROC 4

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour).

Number of the contributing scenario **6**
Contributing exposure scenario controlling worker exposure for PROC 8a

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Number of the contributing scenario **7**
Contributing exposure scenario controlling worker exposure for PROC 8b

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a basic standard of general ventilation (1 to 3 air changes per hour). Effectiveness of LEV (local exhaust ventilation): 95 % (inhalative).

Number of the contributing scenario **8**
Contributing exposure scenario controlling worker exposure for PROC 9

Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Provide a basic standard of general ventilation (1 to 3 air changes per hour). Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative).

Exposure estimation and reference to its source

Environment
PEC = predicted environmental concentration (local); RCR = risk characterisation ratio

Fresh Water (Pelagic)	PEC: 4.28E-3 mg/l; RCR: 0.052
Fresh Water (Sediment)	PEC: 0.017 mg/kg dw; RCR: 0.052
Marine Water (Pelagic)	PEC: 4.88E-4 mg/l; RCR: 0.06
Marine Water (Sediment)	PEC: 1.93E-3 mg/kg dw; RCR: 0.059
Agricultural Soil	PEC: 3.06E-3 mg/kg dw; RCR: 0.184
Sewage Treatment Plant (Effluent)	PEC: 0 mg/l; RCR: < 0.01

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.031
Proc 2	EE(inhal): 15.44
Proc 3	EE(inhal): 30.88
Proc 8a	EE(inhal): 15.44
Proc 8b	EE(inhal): 3.861
Proc 9	EE(inhal): 15.44

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio. Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative

calculated values.

Proc 1	RCR(inhal): < 0.01
Proc 2	RCR(inhal): 0.05
Proc 3	RCR(inhal): 0.1
Proc 8a	RCR(inhal): 0.05
Proc 8b	RCR(inhal): 0.012
Proc 9	RCR(inhal): 0.05

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

For specific information regarding the SPERC used please refer to the ESIG webpage https://www.esig.org/reach-ges/environment/

associated uses:
Should consumer uses be associated with this exposure scenario, please contact OXEA for further details
Other combinations of operational conditions may also be safe. Please contact OXEA in case your local operational conditions differ from the ones described above and you are unsure if they are also safe