SAFETY DATA SHEET

2-Ethylhexanoic acid
10040

Version / Revision	7	**Revision Date**	29-Apr-2020
Supersedes Version	6.00	**Issuing date**	15-May-2020

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

1.1. Product identifier

Identification of the substance/preparation **2-Ethylhexanoic acid**

CAS-No 149-57-5
EC No. 205-743-6
Registration number (REACh) 01-2119488942-23

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

Identified uses
Intermediate
Formulation
laboratory chemicals
Functional Fluids

Uses advised against
Consumer uses
To avoid exposure of consumers

1.3. Details of the supplier of the safety data sheet

Company/Undertaking Identification
OQ Chemicals GmbH
Rheinpromenade 4A
D-40789 Monheim
Germany

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

Reproductive toxicity Category 2, H361d

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	**Warning**
Hazard statements	H361d: Suspected of damaging the unborn child.
Precautionary statements	P201: Obtain special instructions before use. P202: Do not handle until all safety precautions have been read and understood. P280: Wear protective gloves/protective clothing/eye protection/face protection. P308 + P313: IF exposed or concerned: Get medical advice/ attention. P405: Store locked up. P501: Dispose of contents/container in accordance with local regulation.

2.3. Other hazards

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)

SECTION 3: Composition / information on ingredients

3.1. Substances

Component	CAS-No	REACh-No	1272/2008/EC	Concentration (%)
2-Ethylhexanoic acid	149-57-5	01-2119488942-23	Repr. 2; H361d	> 99,20

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

Call a physician immediately. Do not induce vomiting without medical advice.

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

Main symptoms
None known.

Special hazard
Lung irritation, Lung oedema, Kidney disorders, respiratory disorder.

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

General advice
Remove contaminated, soaked clothing immediately and dispose of safely. First aider needs to protect himself.

Treat symptomatically. If ingested, flush stomach and compensate acidosis.

SECTION 5: Firefighting measures

5.1. Extinguishing media

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

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
Vapours are heavier than air and may spread along floors

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.

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. 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.

Advice on the protection of the environment
See Section 8: Environmental exposure controls.

Incompatible products
bases
amines
strong oxidizing 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.

Technical measures/Storage conditions
Keep containers tightly closed in a cool, well-ventilated place. Handle and open container with care. Recommended storage temperature: =< 38 °C / =< 100 °F.

Temperature class
T2

7.3. Specific end use(s)

Intermediate
Formulation
laboratory chemicals
Functional Fluids
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

No exposure limits established.

DNEL & PNEC

2-Ethylhexanoic acid, CAS: 149-57-5
Workers

DN(M)EL - long-term exposure - systemic effects - Inhalation	14 mg/m³
DN(M)EL - acute / short-term exposure - systemic effects - Inhalation	No hazard identified
DN(M)EL - long-term exposure - local effects - Inhalation	No hazard identified
DN(M)EL - acute / short-term exposure - local effects - Inhalation	Low hazard (no threshold derived)
DN(M)EL - long-term exposure - systemic effects - Dermal	2 mg/kg bw/day
DN(M)EL - acute / short-term exposure - systemic effects - Dermal	Low hazard (no threshold derived)
DN(M)EL - long-term exposure - local effects - Dermal	No hazard identified
DN(M)EL - acute / short-term exposure - local effects - Dermal	Low hazard (no threshold derived)

General population

DN(M)EL - long-term exposure - systemic effects - Inhalation	3,5 mg/m³
DN(M)EL - acute / short-term exposure - systemic effects - Inhalation	Low hazard (no threshold derived)
DN(M)EL - long-term exposure - local effects - Inhalation	No hazard identified
DN(M)EL - acute / short-term exposure - local effects - Inhalation	Low hazard (no threshold derived)
DN(M)EL - long-term exposure - systemic effects - Dermal	1 mg/kg bw/day
DN(M)EL - acute / short-term exposure - systemic effects - Dermal	Low hazard (no threshold derived)
DN(M)EL - long-term exposure - local effects - Dermal	No hazard identified
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 mg/kg bw/day
DN(M)EL - acute / short-term exposure - systemic effects - Oral	Low hazard (no threshold derived)
DN(M)EL - local effects - eyes	low hazard

Environment

PNEC aqua - freshwater	0,36 mg/l
PNEC aqua - marine water	0,036 mg/l
PNEC aqua - intermittent releases	0,493 mg/l
PNEC STP	71,7 mg/l
PNEC sediment - freshwater	6,37 mg/kg
PNEC sediment - marine water	0,637 mg/kg
PNEC Air	No hazard identified
PNEC soil	1,06 mg/kg
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	nitrile rubber
Evaluation	according to EN 374: level 6
Glove thickness	approx 0,55 mm
Break through time	> 480 min
Suitable material	polyvinylchloride
Evaluation	Information derived from practical experience

Glove thickness approx 0.8 mm

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
Use product only in closed system. 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

Appearance	liquid
Colour	colourless
Odour	mild
Odour threshold	No data available
pH	3,75 (1 g/l in water @ 25 °C (77 °F)) DIN 19268
Melting point/range	-83 °C (Pour point)
Boiling point/range	228 °C @ 1013 hPa
Method	OECD 103
Flash point	116 °C @ 1013 hPa
Method	closed cup
Evaporation rate	No data available
Flammability (solid, gas)	Does not apply, the substance is a liquid
Lower explosion limit	0,8 Vol %
Upper explosion limit	6,7 Vol %

Vapour pressure

Values [hPa]	Values [kPa]	Values [atm]	@ °C	@ °F	Method
0,04	0,004	< 0,001	20	68	
4,3	0,43	0,004	50	122	

Vapour density 5,0 (Air = 1) @ 20 °C (68 °F)

Relative density

Values	@ °C	@ °F	Method
0,9067	20	68	DIN 51757

Solubility	1,4 g/l @ 20 °C, in water
log Pow	2,7 (measured), OECD 107
Autoignition temperature	310 °C
Method	DIN 51794
Decomposition temperature	No data available
Viscosity	8 mPa*s @ 20 °C
Method	dynamic, ASTM D445

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

9.2. Other information

Molecular weight	144,21
Molecular formula	C8 H16 O2
Refractive index	1,425 @ 20 °C

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

Hazardous polymerisation does not occur.

10.4. Conditions to avoid

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

10.5. Incompatible materials

bases, amines, strong oxidizing agents.

10.6. Hazardous decomposition products

No decomposition if stored and applied as directed.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

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

Acute toxicity				
2-Ethylhexanoic acid (149-57-5)				
Routes of Exposure	Endpoint	Values	Species	Method
Oral	LD50	2043 mg/kg	rat, female	OECD 401
Dermal	LD50	> 2000 mg/kg	rat, male/female	OECD 402
Inhalative	LC0	0,11 mg/l (8 h)	rat	OECD 403

2-Ethylhexanoic acid, CAS: 149-57-5
Assessment

Based on available data, the classification criteria are not met for:
Acute oral toxicity
Acute dermal toxicity
Acute inhalation toxicity

Irritation and corrosion				
2-Ethylhexanoic acid (149-57-5)				
Target Organ Effects	Species	Result	Method	
Skin	rabbit	Mild skin irritation	OECD 404	
Eyes	rabbit	No eye irritation	OECD 405	24h

2-Ethylhexanoic acid, CAS: 149-57-5
Assessment
Based on available data, the classification criteria are not met for:
skin irritation/corrosion
eye irritation/corrosion
For respiratory irritation, no data are available

Sensitization				
2-Ethylhexanoic acid (149-57-5)				
Target Organ Effects	Species	Evaluation	Method	
Skin	guinea pig	not sensitizing	OECD 406	

2-Ethylhexanoic acid, CAS: 149-57-5
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				
2-Ethylhexanoic acid (149-57-5)				
Type	Dose	Species	Method	
Subchronic toxicity	NOAEL: ~ 200 mg/kg/d (90d)	mouse, male/female	EPA OTS 795.2600	Oral
Subchronic toxicity	NOAEL: ~300 mg/kg/d (90d)	rat, male/female	EPA OTS 795.2600	Oral

2-Ethylhexanoic acid, CAS: 149-57-5
Assessment
Based on available data, the classification criteria are not met for:
STOT RE

Carcinogenicity, Mutagenicity, Reproductive toxicity					
2-Ethylhexanoic acid (149-57-5)					
Type	Dose	Species	Evaluation	Method	
Developmental Toxicity	NOAEL 25 mg/kg/d	rabbit		EPA OTS 798.4900	Maternal toxicity
Developmental Toxicity	NOAEL 250 mg/kg/d	rabbit		EPA OTS 798.4900	Developmental toxicity
Developmental Toxicity	NOAEL 250 mg/kg/d	rat		EPA OTS 798.4900	Maternal toxicity
Developmental Toxicity	NOAEL 100 mg/kg/d	rat		EPA OTS 798.4900	Developmental toxicity

Reproductive toxicity	NOAEL 250 mg/kg/d	rat, parental		Oral OECD 443	
Reproductive toxicity	NOAEL 800 mg/kg/d	rat, 1. Generation, male/female		Oral OECD 443	
Mutagenicity		CHO (Chinese Hamster Ovary) cells	negative	OECD 476 (Mammalian Gene Mutation)	In vitro study
Mutagenicity		mouse lymphoma cells	negative	OECD 476 (Mammalian Gene Mutation)	
Mutagenicity		Salmonella typhimurium	negative	OECD 471 (Ames)	In vitro study
Mutagenicity		rat lymphocytes	negative	OECD 473 (Chromosomal Aberration)	In vitro study
Mutagenicity		mouse male/female	negative	OECD 474	Oral micronucleus test

2-Ethylhexanoic acid, CAS: 149-57-5
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
Directive 1272/2008/EC, Annex VI: Repr. 2
Evaluation
In vitro tests showed mutagenic effects
Did not show carcinogenic effects in animal experiments
No indication for a carcinogenic potential

2-Ethylhexanoic acid, CAS: 149-57-5
Target Organ Systemic Toxicant - Single exposure
Based on available data, the classification criteria are not met for:
STOT SE
Target Organ Systemic Toxicant - Repeated exposure
Based on available data, the classification criteria are not met for:
STOT RE
Aspiration toxicity
no data available
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			
2-Ethylhexanoic acid (149-57-5)			
Species	Exposure time	Dose	Method
Oryzias latipes (Medaka)	96h	LC50: > 100 mg/l	OECD 203

Daphnia magna (Water flea)	48h	EC50: 85,4 mg/l	79/831/EEC.C2
Desmodesmus subspicatus	72h	EC50: 49,3 mg/l	DIN 38412, part 9
Pseudomonas putida	17 h	EC50: 112,1 mg/l (Growth inhibition)	DIN 38412, part 8

Long term toxicity				
2-Ethylhexanoic acid (149-57-5)				
Type	Species	Dose	Method	
Reproductive toxicity	Daphnia magna (Water flea)	NOEC: 25 mg/l	OECD 211	
Aquatic toxicity	Desmodesmus subspicatus	EC10: 32 mg/l (3 h)	DIN 38412 / part 9	

12.2. Persistence and degradability

2-Ethylhexanoic acid, CAS: 149-57-5
Biodegradation
99 % (28 d), Sewage, domestic, aerobic, OECD 301 E.

Abiotic Degradation		
2-Ethylhexanoic acid (149-57-5)		
Type	Result	Method
Photolysis	Half-life (DT50): 47,1 h	calculated
Hydrolysis	not expected	

12.3. Bioaccumulative potential

2-Ethylhexanoic acid (149-57-5)		
Type	Result	Method
log Pow	2,7	measured, OECD 107

12.4. Mobility in soil

2-Ethylhexanoic acid, CAS: 149-57-5
No data available

2-Ethylhexanoic acid (149-57-5)		
Type	Result	Method
Adsorption/Desorption	Koc: 140,87 @ 20 °C	OECD 106
Surface tension	Surface activity not expected	
Distribution to environmental compartments	Air: 0,93 Soil: 3,64 Water: 91,7 Sediment: 3,68	

12.5. Results of PBT and vPvB assessment

2-Ethylhexanoic acid, CAS: 149-57-5
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. Other adverse effects

2-Ethylhexanoic acid, CAS: 149-57-5
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

Section 14.1 - 14.6

ADR/RID	Not restricted
ADN	ADN Container Not restricted
ADN	ADN Tanker
14.1. UN number	ID 9006
14.2. UN proper shipping name	Environmentally hazardous substance, liquid, n.o.s.
14.3. Transport hazard class(es)	9
Subsidiary Risk	N3, F
14.4. Packing group	-
14.5. Environmental hazards	Fish and tree
14.6. Special precautions for user	no data available
ICAO-TI / IATA-DGR	Not restricted
IMDG	Not restricted

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

Product name	2-Ethylhexanoic acid
Ship type	3
Pollution category	Y

SECTION 15: Regulatory information

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

Regulation 1272/2008, Annex VI

2-Ethylhexanoic acid, CAS: 149-57-5

Classification	Repr. 2; H361d
Hazard pictograms	GHS08 Health hazard
Signal word	Warning
Hazard statements	H361d

DI 2012/18/EU (Seveso III)

Category	not subject

DI 1999/13/EC (VOC Guideline)

Component	Status
2-Ethylhexanoic acid CAS: 149-57-5	not subject

Other regulations

2-Ethylhexanoic acid, CAS: 149-57-5
DI 92/85/EEC

International Inventories

2-Ethylhexanoic acid, CAS: 149-57-5
AICS (AU)
DSL (CA)
IECSC (CN)
EC-No. 2057436 (EU)
ENCS (2)-608 (JP)
ISHL (2)-608 (JP)
KECI KE-13740 (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
H361d: Suspected of damaging the unborn child.

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 OQ 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 OQ homepage (www.chemicals.oq.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. OQ 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

Other combinations of operational conditions may also be safe. Please contact OQ in case your local operational conditions differ from the ones described below and you are unsure if they are also safe

Operational conditions and risk management measures
Wear suitable coveralls to prevent exposure to skin, where direct contact with substances is possible. Wear suitable eye protection, where direct contact (e.g. splashes) with substance is possible. Wear suitable gloves tested to EN 374 for activities, where direct contact with substance is possible. Supervision in place to check that

the RMMs in place are being used correctly and OCs followed. Avoid direct contact with the chemical/the product/the preparation by establishing organisational measures.

Exposure scenario identification

1 Industrial use resulting in manufacture of another substance (use of intermediates)
2 Formulation & (re)packing of substances and mixtures
3 Use in laboratories
4 Use in laboratories
5 Functional Fluids
6 Functional Fluids
7 Functional Fluids

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

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)
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

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

Product characteristics
Refer to attached safety data sheets

Further explanations
Industrial use
Assumes use at not more than 20°C above ambient temperature (unless stated differently)

Contributing Scenarios

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

Further specification
release factors for (Sp)ERC were modified
assessment tool used: Chesar 2.2
Amounts used
Daily amount per site: 25 to
Annual amount per site: 2500 to
Frequency and duration of use
Covers use up to: 100 days
Environment factors not influenced by risk management
River flow rate: 18000 m³/d

Local freshwater dilution factor: 10
Local marine water dilution factor: 100
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from process: 0.1 %
Release fraction to wastewater from process: 0.1 %
Release fraction to soil from process: 0.1%
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 (%): 87.5
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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 %
Liquid, vapour pressure < 0,5 kPa at STP
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 **3**
Contributing exposure scenario controlling worker exposure for PROC 2

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 %
Liquid, vapour pressure < 0,5 kPa at STP
Frequency and duration of use
8 h (full shift)
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).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 %
Liquid, vapour pressure < 0,5 kPa at STP

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 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario 5
Contributing exposure scenario controlling worker exposure for PROC 8b

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 %
Liquid, vapour pressure < 0,5 kPa at STP
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 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 good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Exposure estimation and reference to its source

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

Fresh Water (Pelagic)	PEC: 0.16 mg/l; RCR: 0.43
Fresh Water (Sediment)	PEC: 2.76 mg/kg dw; RCR: 0.43
Marine Water (Pelagic)	PEC: 0.02 mg/l; RCR: 0.43
Marine Water (Sediment)	PEC: 0.28 mg/kg dw; RCR: 0.43
Agricultural Soil	PEC: 0.49 mg/kg dw; RCR: 0.46
Sewage Treatment Plant (Effluent)	PEC: 1.56 mg/l; RCR: 0.02

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

Proc 1	EE(inhal): 0.06 ; EE(derm): 0.03
Proc 2	EE(inhal): 6.01 ; EE(derm): 0.07
Proc 3	EE(inhal): 5.41 ; EE(derm): 0.03
Proc 8b	EE(inhal): 5.41 ; EE(derm): 0.69

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio; RCR(derm): dermal risk characterisation ratio; total RCR= RCR(inhal) +RCR(derm). 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): 0.004 ; RCR(derm): 0.02
Proc 2	RCR(inhal): 0.43 ; RCR(derm): 0.03
Proc 3	RCR(inhal): 0.39 ; RCR(derm): 0.02
Proc 8b	RCR(inhal): 0.39 ; RCR(derm): 0.34

Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES
Usage of relase factors allows downstream users to verify in a first approximation, if the combination of local usage and production conditions meets the defined release quantities resulting from this exposure scenario (calculated as M(site) [see amounts used, contributing scenario 1] x release factor [Technical conditions and measures at process level (source) to prevent release; contributing scenario 1])

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]
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)

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

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
Assumes use at not more than 20°C above ambient temperature (unless stated differently)

Contributing Scenarios

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

Further specification

Sperc EFCC 2.1c.v1,
assessment tool used:, Chesar 2.2.
Amounts used
Daily amount per site: 4.6 to
Annual amount per site: 1000 to
Fraction of Regional tonnage used locally: 1
Frequency and duration of use
Covers use up to: 220 days
Environment factors not influenced by risk management
River flow rate: 18000 m³/d Local freshwater dilution factor: 10 Local marine water dilution factor: 100
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from process: 0 %
Release fraction to wastewater from process: 0.5 %
Release fraction to soil from process: 0%
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 (%): 87.5
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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Liquid, vapour pressure < 0,5 kPa at STP
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 cm²)
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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Liquid, vapour pressure < 0,5 kPa at STP
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
Area potentially exposed: corresponds to palm of 2 hands (480 cm²)
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 chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario **4**

Contributing exposure scenario controlling worker exposure for PROC 3

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Liquid, vapour pressure < 0,5 kPa at STP
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 use
Technical conditions and measures to control dispersion from source towards the worker
provide a good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Liquid, vapour pressure < 0,5 kPa at STP
Frequency and duration of use
8 h (full shift)
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 use
Technical conditions and measures to control dispersion from source towards the worker
provide a good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Liquid, vapour pressure < 0,5 kPa at STP
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 use
Technical conditions and measures to control dispersion from source towards the worker
provide a good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Liquid, vapour pressure < 0,5 kPa at STP
Frequency and duration of use
Avoid carrying out activities involving exposure for more than 1 hour
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 good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Liquid, vapour pressure < 0,5 kPa at STP
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 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 good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Liquid, vapour pressure < 0,5 kPa at STP
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
Area potentially exposed: corresponds to palm of 2 hands (480 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Exposure estimation and reference to its source

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

Fresh Water (Pelagic)	PEC: 0.14 mg/l; RCR: 0.40
Fresh Water (Sediment)	PEC: 2.52 mg/kg dw; RCR: 0.40
Marine Water (Pelagic)	PEC: 0.01 mg/l; RCR: 0.40
Marine Water (Sediment)	PEC: 0.25 mg/kg dw; RCR: 0.40
Agricultural Soil	PEC: 0.44 mg/kg dw; RCR: 0.42
Sewage Treatment Plant (Effluent)	PEC: 1.42 mg/l; RCR: 0.02

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]; EE(derm): Estimated dermal long-term exposure [mg/kg b.w./d]. 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): 0.06 ; EE(derm): 0.03
Proc 2	EE(inhal): 6.01 ; EE(derm): 0.07
Proc 3	EE(inhal): 5.41 ; EE(derm): 0.03
Proc 4	EE(inhal): 9.01 ; EE(derm): 0.34
Proc 5	EE(inhal): 5.41 ; EE(derm): 0.69
Proc 8a	EE(inhal): 3.61 ; EE(derm): 0.69
Proc 8b	EE(inhal): 5.41 ; EE(derm): 0.69
Proc 9	EE(inhal): 9.01 ; EE(derm): 0.34

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio; RCR(derm): dermal risk characterisation ratio; total RCR= RCR(inhal) +RCR(derm). 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): 0.004 ; RCR(derm): 0.017
Proc 2	RCR(inhal): 0.43 ; RCR(derm): 0.03
Proc 3	RCR(inhal): 0.39 ; RCR(derm): 0.02
Proc 4	RCR(inhal): 0.64 ; RCR(derm): 0.17
Proc 5	RCR(inhal): 0.39 ; RCR(derm): 0.34
Proc 8a	RCR(inhal): 0.26 ; RCR(derm): 0.34
Proc 8b	RCR(inhal): 0.39 ; RCR(derm): 0.34
Proc 9	RCR(inhal): 0.62 ; RCR(derm): 0.17

Number of the ES 3

Short title of the exposure scenario
Use in laboratories

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]
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
Use of the substance within laboratory settings, including material transfers and equipment cleaning

Further explanations
Industrial use
Assumes use at not more than 20°C above ambient temperature (unless stated differently)

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,
assessment tool used:, Chesar 2.2.
Amounts used
Daily amount per site: 0.01 to
Annual amount per site: 1 to
Fraction of Regional tonnage used locally: 1
Frequency and duration of use
Covers use up to: 100 days
Environment factors not influenced by risk management
River flow rate: 18000 m³/d Local freshwater dilution factor: 10 Local marine water dilution factor: 100
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from process: 1 %
Release fraction to wastewater from process: 0.5 %
Release fraction to soil from process: 0.1%
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 (%): 87.5
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 15

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Liquid, vapour pressure < 0,5 kPa at STP
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 cm²)
Other given operational conditions affecting workers exposure
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): 90 % (inhalative); 0 % (dermal). 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 chemically resistant gloves (tested to EN374) in combination with specific activity training.

Exposure estimation and reference to its source

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

Fresh Water (Pelagic)	PEC: 0.0005 mg/l; RCR: 0.001
Fresh Water (Sediment)	PEC: 0.009 mg/kg dw; RCR: 0.001
Marine Water (Pelagic)	PEC: 0.00005 mg/l; RCR: 0.001
Marine Water (Sediment)	PEC: 0.0009 mg/kg dw; RCR: 0.001
Agricultural Soil	PEC: 0.001 mg/kg dw; RCR: 0.001
Sewage Treatment Plant (Effluent)	PEC: 0.003 mg/l; RCR: 0.00004

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]; EE(derm): Estimated dermal long-term exposure [mg/kg b.w./d]. Exposure estimates are given for either short-term or long-term exposure depending on which lead to more conservative risk characterisation ratios. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 15	EE(inhal): 3.00 ; EE(derm): 0.02

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio; RCR(derm): dermal risk characterisation ratio; total RCR= RCR(inhal) +RCR(derm). 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 15	RCR(inhal): 0.22 ; RCR(derm): 0.009

Number of the ES 4

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]
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
Assumes use at not more than 20°C above ambient temperature (unless stated differently)

Contributing Scenarios

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

Further specification

assessment tool used:, Chesar 2.2.
Amounts used
daily wide dispersive use: 0.0000005 to/d
Amounts used (EU): 1 to/a
Fraction of Regional tonnage used locally: 0.002
Fraction of EU tonnage used in region: 0.1
Frequency and duration of use
Covers use up to: 365 days
Environment factors not influenced by risk management
River flow rate: 18000 m³/d Local freshwater dilution factor: 10 Local marine water dilution factor: 100
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: 100 %
Release fraction to wastewater from process: 100 %
Release fraction to soil from process: 0%
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 (%): 87.5
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 15

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Liquid, vapour pressure < 0,5 kPa at STP
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 cm²)
Other given operational conditions affecting workers exposure
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); 0 % (dermal). 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 chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Exposure estimation and reference to its source

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

Fresh Water (Pelagic)	PEC: 0.0002 mg/l; RCR: 0.0006
Fresh Water (Sediment)	PEC: 0.004 mg/kg dw; RCR: 0.0006
Marine Water (Pelagic)	PEC: 0.00002 mg/l; RCR: 0.0006
Marine Water (Sediment)	PEC: 0.0004 mg/kg dw; RCR: 0.0006
Agricultural Soil	PEC: 0.0002 mg/kg dw; RCR: 0.0002
Sewage Treatment Plant (Effluent)	PEC: 0.00003 mg/l; RCR: 0.00005

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]; EE(derm): Estimated dermal long-term exposure [mg/kg b.w./d]. Exposure estimates are given for either short-term or long-term exposure depending on which lead to more conservative risk characterisation ratios. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 15	EE(inhal): 6.01 ; EE(derm): 0.03

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio; RCR(derm): dermal risk characterisation ratio; total RCR= RCR(inhal) +RCR(derm). 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 15	RCR(inhal): 0.43 ; RCR(derm): 0.02

Number of the ES 5

Short title of the exposure scenario
Functional Fluids

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]
ERC7: Industrial use of substances in closed systems

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in industrial equipment including maintenance and related material transfers

Further explanations

Industrial use
Assumes use at not more than 20°C above ambient temperature (unless stated differently)

Contributing Scenarios

Number of the contributing scenario 1
Contributing exposure scenario controlling environmental exposure for ERC 7

Further specification
release factors for (Sp)ERC were modified,
assessment tool used:, Chesar 2.2.
Amounts used
Daily amount per site: 2 to
Annual amount per site: 200 to
Fraction of Regional tonnage used locally: 1
Frequency and duration of use
Covers use up to: 100 days
Environment factors not influenced by risk management
River flow rate: 18000 m³/d Local freshwater dilution factor: 10 Local marine water dilution factor: 100
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: 1 %
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 (m3/d): 2000
The minimum grade of elimination in the sewage plant is (%): 87.5
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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 25 %
Liquid, vapour pressure < 0,5 kPa at STP
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 cm²)
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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 25 %
Liquid, vapour pressure < 0,5 kPa at STP
Frequency and duration of use

8 h (full shift)
Human factors not influenced by risk management
Area potentially exposed: corresponds to palm of 2 hands (480 cm²)
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 chemically resistant gloves (tested to EN374) in combination with specific activity training.

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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 25 %
Liquid, vapour pressure < 0,5 kPa at STP
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 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 25 %
Liquid, vapour pressure < 0,5 kPa at STP
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
Area potentially exposed: corresponds to palm of 2 hands (480 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 25 %
Liquid, vapour pressure < 0,5 kPa at STP

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 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 good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 25 %
Liquid, vapour pressure < 0,5 kPa at STP
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 good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario 7
Contributing exposure scenario controlling worker exposure for PROC 9

Product characteristics
Covers percentage substance in the product up to 25 %
Liquid, vapour pressure < 0,5 kPa at STP
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
Area potentially exposed: corresponds to palm of 2 hands (480 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Exposure estimation and reference to its source

Environment

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

Fresh Water (Pelagic)	PEC: 0.13 mg/l; RCR: 0.35
Fresh Water (Sediment)	PEC: 2.21 mg/kg dw; RCR: 0.35
Marine Water (Pelagic)	PEC: 0.01 mg/l; RCR: 0.35
Marine Water (Sediment)	PEC: 0.22 mg/kg dw; RCR: 0.35
Agricultural Soil	PEC: 0.39 mg/kg dw; RCR: 0.37
Sewage Treatment Plant (Effluent)	PEC: 1.25 mg/l; RCR: 0.02

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]; EE(derm): Estimated dermal long-term exposure [mg/kg b.w./d]. Exposure estimates are given for either short-term or long-term exposure depending on which lead to more conservative risk characterisation ratios. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.04 ; EE(derm): 0.02
Proc 2	EE(inhal): 3.61 ; EE(derm): 0.04
Proc 3	EE(inhal): 7.57 ; EE(derm): 0.02
Proc 4	EE(inhal): 5.41 ; EE(derm): 0.21
Proc 8a	EE(inhal): 6.49 ; EE(derm): 0.41
Proc 8b	EE(inhal): 5.41 ; EE(derm): 0.41
Proc 9	EE(inhal): 5.41 ; EE(derm): 0.21

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio; RCR(derm): dermal risk characterisation ratio; total RCR= RCR(inhal) +RCR(derm). 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): 0.003 ; RCR(derm): 0.01
Proc 2	RCR(inhal): 0.26 ; RCR(derm): 0.02
Proc 3	RCR(inhal): 0.54 ; RCR(derm): 0.01
Proc 4	RCR(inhal): 0.39 ; RCR(derm): 0.10
Proc 8a	RCR(inhal): 0.46 ; RCR(derm): 0.21
Proc 8b	RCR(inhal): 0.39 ; RCR(derm): 0.21
Proc 9	RCR(inhal): 0.39 ; RCR(derm): 0.10

Number of the ES 6

Short title of the exposure scenario

Functional Fluids

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)
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC20: Heat and pressure transfer fluids in dispersive, professional use but closed systems

Environmental release categories [ERC]
ERC9a: Wide dispersive indoor use of substances in closed systems

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in professional equipment including maintenance and related material transfers

Further explanations
Professional use

Assumes use at not more than 20°C above ambient temperature (unless stated differently)

Contributing Scenarios

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

Further specification
release factors for (Sp)ERC were modified,
assessment tool used:, Chesar 2.2.
Amounts used
daily wide dispersive use: 0.0002 to/d
Amounts used (EU): 100 to/a
Fraction of EU tonnage used in region: 0.1
Fraction of Regional tonnage used locally: 0.002
Frequency and duration of use
Covers use up to: 100 days
Environment factors not influenced by risk management
River flow rate: 18000 m³/d
Local freshwater dilution factor: 10
Local marine water dilution factor: 100
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: 1 %
Release fraction to wastewater from process: 0.5 %
Release fraction to soil from process: 0.1%
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 (%): 87.5
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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 25 %
Liquid, vapour pressure < 0,5 kPa at STP
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 cm²)
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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 25 %

Liquid, vapour pressure < 0,5 kPa at STP
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
Area potentially exposed: corresponds to palm of 2 hands (480 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 25 %
Liquid, vapour pressure < 0,5 kPa at STP
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 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for PROC 8a

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 25 %
Liquid, vapour pressure < 0,5 kPa at STP
Frequency and duration of use
Avoid carrying out activities involving exposure for more than 1 hour
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 good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Number of the contributing scenario **6**
Contributing exposure scenario controlling worker exposure for PROC 9

Further specification
assessment tool used: Chesar 2.2
Product characteristics

Covers percentage substance in the product up to 25 %
Liquid, vapour pressure < 0,5 kPa at STP
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 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Number of the contributing scenario 7
Contributing exposure scenario controlling worker exposure for PROC 20

Further specification
assessment tool used: Chesar 2.2
Product characteristics
Covers percentage substance in the product up to 25 %
Liquid, vapour pressure < 0,5 kPa at STP
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
Area potentially exposed: corresponds to palm of 2 hands (480 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
provide a good standard of controlled ventilation (5 to 10 air changes per hour) .
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Exposure estimation and reference to its source

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

Fresh Water (Pelagic)	PEC: 0.0002 mg/l; RCR: 0.0006
Fresh Water (Sediment)	PEC: 0.004 mg/kg dw; RCR: 0.0006
Marine Water (Pelagic)	PEC: 0.00002 mg/l; RCR: 0.0006
Marine Water (Sediment)	PEC: 0.0004 mg/kg dw; RCR: 0.0006
Agricultural Soil	PEC: 0.0002 mg/kg dw; RCR: 0.0002
Sewage Treatment Plant (Effluent)	PEC: 0.00006 mg/l; RCR: 0.0000009

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative long-term exposure [mg/m³]; EE(derm): Estimated dermal long-term exposure [mg/kg b.w./d]. Exposure estimates are given for either short-term or long-term exposure depending on which lead to more conservative risk characterisation ratios. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.04 ; EE(derm): 0.02
Proc 2	EE(inhal): 5.41 ; EE(derm): 0.08
Proc 3	EE(inhal): 7.57 ; EE(derm): 0.04
Proc 8a	EE(inhal): 5.41 ; EE(derm): 0.82
Proc 9	EE(inhal): 6.49 ; EE(derm): 0.41
Proc 20	EE(inhal): 5.41 ; EE(derm): 0.10

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio; RCR(derm): dermal risk characterisation ratio; total RCR= RCR(inhal) +RCR(derm). 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): 0.003 ; RCR(derm): 0.01
Proc 2	RCR(inhal): 0.39 ; RCR(derm): 0.04
Proc 3	RCR(inhal): 0.54 ; RCR(derm): 0.02
Proc 8a	RCR(inhal): 0.39 ; RCR(derm): 0.41
Proc 9	RCR(inhal): 0.46 ; RCR(derm): 0.41
Proc 20	RCR(inhal): 0.39 ; RCR(derm): 0.05

Number of the ES 7

Short title of the exposure scenario
Functional Fluids

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)
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
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
Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in professional equipment including maintenance and related material transfers

Further explanations
Professional use
Assumes use at not more than 20°C above ambient temperature (unless stated differently)
Human health hazard assessment:
see attached exposure scenario No: 6

Contributing Scenarios

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

Further specification
release factors for (Sp)ERC were modified,

assessment tool used:, Chesar 2.2.
Amounts used
daily wide dispersive use: 0.0002 to/d
Amounts used (EU): 100 to/a
Fraction of EU tonnage used in region: 0.1
Fraction of Regional tonnage used locally: 0.002
Frequency and duration of use
Covers use up to: 100 days
Environment factors not influenced by risk management
River flow rate: 18000 m³/d
Local freshwater dilution factor: 10
Local marine water dilution factor: 100
Other given operational conditions affecting environmental exposure
Outdoor use
Technical conditions and measures at process level (source) to prevent release
Release fraction to air from process: 1 %
Release fraction to wastewater from process: 0.5 %
Release fraction to soil from process: 0.1%
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 (%): 87.5
Conditions and measures related to external treatment of waste for disposal
Dispose of waste product or used containers according to local regulations

Exposure estimation and reference to its source

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

Fresh Water (Pelagic)	PEC: 0.0002 mg/l; RCR: 0.0006
Fresh Water (Sediment)	PEC: 0.004 mg/kg dw; RCR: 0.0006
Marine Water (Pelagic)	PEC: 0.00002 mg/l; RCR: 0.0006
Marine Water (Sediment)	PEC: 0.0004 mg/kg dw; RCR: 0.0006
Agricultural Soil	PEC: 0.0002 mg/kg dw; RCR: 0.0002
Sewage Treatment Plant (Effluent)	PEC: 0.00006 mg/l; RCR: 0.0000009