Di-tert-Butyl Polysulfide (TBPS 454)

Version 1.18 Revision Date 2023-09-19

According to Regulation (EC) No. 1907/2006, Regulation (EC) No. 2020/878

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

1.1 Product identifier

Product information

Product Name : Di-tert-Butyl Polysulfide (TBPS 454)
Material : 1120381, 1072616, 1086440, 1086442, 1086441, 1024577, 1024572, 1024785, 1024784, 1024573, 1024574, 1024576, 1024578, 1024575, 1105172

EC-No.Registration number

Chemical name	CAS-No. EC-No. Index No.	Legal Entity Registration number
Di-tert-butyl Polysulfide	68937-96-2 273-103-3	Chevron Phillips Chemicals International NV 01-2119540515-43-0001

1.2

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

Relevant Identified Uses Supported : Manufacture
Use as an intermediate
Formulation
Lubricants - Industrial

1.3

Details of the supplier of the safety data sheet

Company : Chevron Phillips Chemical Company LP
Specialty Chemicals
10001 Six Pines Drive
The Woodlands, TX 77380

Local : Chevron Phillips Chemicals International N.V.
Airport Plaza (Stockholm Building)
Leonardo Da Vincilaan 19
1831 Diegem
Belgium

SDS Requests: (800) 852-5530

Responsible Party: Product Safety Group
Email:sds@cpchem.com

1.4

Emergency telephone:

Health:
866.442.9628 (North America)
1.832.813.4984 (International)
Transport:
CHEMTREC 800.424.9300 or 703.527.3887(int'l)
Asia: CHEMWATCH (+612 9186 1132) China: 0532 8388 9090
Mexico CHEMTREC 01-800-681-9531 (24 hours)
South America SOS-Cotec Inside Brazil: 0800.111.767 Outside Brazil: +55.19.3467.1600
Argentina: +(54)-1159839431
EUROPE: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Austria: VIZ +43 1 406 43 43 (24 hours/day, 7 days/week)
Belgium: 070 245 245 (24 hours/day, 7 days/week)
Bulgaria: +359 2 9154 233
Croatia: +3851 2348 342 (24 hours/day, 7 days/week)
Cyprus: 1401
Czech Republic: Toxicological Information Center +420 224 919 293, +420 224 915 402
Denmark: Danish Poison Center (Giftlinjen): +45 8212 1212
Estonia: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Finland: 0800 147 111 09 471 977 (24 hours/day)
France: ORFILA number (INRS): + 33 (0) 1 45 42 59 59 (24 hours/day, 7 days/week)
Germany: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Greece: (0030) 2107793777 (24 hours/day, 7 days/week)
Hungary: +36-80-201-199 (24 hours/day, 7 days/week)
Iceland: 543 2222 (24 hours/day, 7 days/week)
Ireland: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Italy: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Latvia: State Fire and Rescue Service, phone number: 112; Toxicology and Sepsis Clinic Poisoning and Drug Information Center, Hipokrāta 2, Riga, Latvia, LV-1038, phone number +371 67042473. (24 hours.)
Liechtenstein: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Lithuania: +370 (85) 2362052
Luxembourg: (+352) 8002 5500 (24 hours/day, 7 days/week)
Malta: +356 2395 2000
The Netherlands: NVIC: +31 (0)88 755 8000
Norway: 22 59 13 00 (24 hours/day, 7 days/week)
Poland: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Portugal: CIAV phone number: +351 800 250 250
Romania: +40213183606
Slovakia: +421 2 5477 4166
Slovenia: Phone number: 112
Spain: National Emergency Telephone Number of Spanish Poison Centre: +34 91 562 04 20 (24 hours/day, 7 days/week)
Sweden: 112 – ask for Poisons Information

Responsible Department	:	Product Safety and Toxicology Group
E-mail address	:	SDS@CPChem.com
Website	:	www.CPChem.com

SECTION 2: Hazards identification

2.1

Classification of the substance or mixture

REGULATION (EC) No 1272/2008

Skin sensitization, Category 1	H317: May cause an allergic skin reaction.
Short-term (acute) aquatic hazard, Category 1	H400: Very toxic to aquatic life.
Long-term (chronic) aquatic hazard, Category 1	H410: Very toxic to aquatic life with long lasting effects.

2.2

Labeling (REGULATION (EC) No 1272/2008)

Hazard pictograms :

Signal Word : Warning

Hazard Statements :

H317	May cause an allergic skin reaction.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements :

Prevention:

P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P273	Avoid release to the environment.
P280	Wear protective gloves.

Response:

P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P362 + P364	Take off contaminated clothing and wash it before reuse.
P391	Collect spillage.

Hazardous ingredients which must be listed on the label:

- 68937-96-2 Di-tert-butyl Polysulfide

2.3

Other hazards

Results of PBT and vPvB assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Endocrine disrupting properties : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 - 3.2
Substance or Mixture

Synonyms : Tertiary-Butyl Polysulfide
di-t-Butyl Polysulfide
tert-Butyl Polysulfide
Polysulfides, di-tert-Butyl
CPChem TBPS 454

Molecular formula : C8H18Sx (x = average of 4.0)

Hazardous ingredients

Chemical name	CAS-No. EC-No. Index No.	Classification (REGULATION (EC) No 1272/2008)	Concentration [wt%]	Specific Conc. Limits, M-factors and ATEs
Di-tert-butyl Polysulfide	68937-96-2 273-103-3	Skin Sens. 1B; H317 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	90 - 100	M [Acute]=1 M [Chronic]=1

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1
Description of first-aid measures

General advice : Move out of dangerous area. Show this material safety data sheet to the doctor in attendance.

If inhaled : If unconscious, place in recovery position and seek medical advice. If symptoms persist, call a physician.

In case of skin contact : If on skin, rinse well with water.

In case of eye contact : Flush eyes with water as a precaution. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.

If swallowed : Keep respiratory tract clear. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician.

4.2 Most important symptoms and effects, both acute and delayed
Notes to physician

Symptoms : No data available.

Risks : No data available.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : No data available.

SECTION 5: Firefighting measures

Flash point : 103°C (217°F)
Method: ASTM D 93

Autoignition temperature	:	225°C (437°F) at 1.005,20 - 1.009,40 hPa Information given is based on data obtained from similar substances.

5.1

Extinguishing media

Unsuitable extinguishing media	:	High volume water jet.

5.2

Special hazards arising from the substance or mixture

Specific hazards during fire fighting	:	Do not allow run-off from fire fighting to enter drains or water courses.

5.3

Advice for firefighters

Special protective equipment for fire-fighters	:	Wear self-contained breathing apparatus for firefighting if necessary.
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Fire and explosion protection	:	Normal measures for preventive fire protection.
Hazardous decomposition products	:	Carbon oxides. Sulfur oxides.

SECTION 6: Accidental release measures

6.1

Personal precautions, protective equipment and emergency procedures

Personal precautions	:	Use personal protective equipment.

6.2

Environmental precautions

Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.

6.3

Methods and materials for containment and cleaning up

Methods for cleaning up	:	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.

6.4

Reference to other sections

For additional details, see the Exposure Scenario in the Annex portion

SECTION 7: Handling and storage

7.1

Precautions for safe handling
Handling

Advice on safe handling	:	Do not breathe vapors/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Dispose of rinse water in accordance with local and national regulations. Persons susceptible to skin sensitization problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.
Advice on protection against fire and explosion	:	Normal measures for preventive fire protection.

7.2
Conditions for safe storage, including any incompatibilities

Storage

Requirements for storage areas and containers	:	Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Electrical installations / working materials must comply with the technological safety standards.

7.3
Specific End Use

Use	:	For additional details, see the Exposure Scenario in the Annex portion

SECTION 8: Exposure controls/personal protection

8.2
Exposure controls
Engineering measures

Adequate ventilation to control airborned concentrations below the exposure guidelines/limits. Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

Personal protective equipment

Respiratory protection	:	If ventilation or other engineering controls are not adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure, a supplied-air NIOSH approved respirator may be appropriate. If exposure to harmful levels of airborne material may occur, a NIOSH approved respirator that provides protection may be appropriate, such as:. A positive pressure, air-supplying respirator may be appropriate if there is potential for uncontrolled release, aerosolization, exposure levels are not known, or other circumstances where air-

purifying respirators may not provide adequate protection.

Hand protection	:	The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
Eye protection	:	Eye wash bottle with pure water. Tightly fitting safety goggles.
Skin and body protection	:	Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Wear as appropriate:. Remove and wash contaminated clothing before re-use. Skin should be washed after contact. Footwear protecting against chemicals.
Hygiene measures	:	Wash hands before breaks and at the end of workday.

For additional details, see the Exposure Scenario in the Annex portion

SECTION 9: Physical and chemical properties

9.1

Information on basic physical and chemical properties

Appearance

Form	:	liquid
Physical state	:	liquid
Color	:	Yellow
Odor	:	Mild, sweet

Safety data

Flash point	:	103°C (217°F) Method: ASTM D 93
Lower explosion limit	:	No data available
Upper explosion limit	:	No data available
Oxidizing properties	:	No
Autoignition temperature	:	225°C (437°F) at 1.005,20 - 1.009,40 hPa Information given is based on data obtained from similar substances.
Thermal decomposition	:	144 °C
Molecular formula	:	C8H18Sx (x = average of 4.0)
Molecular weight	:	242,5 g/mol

pH	:	Not applicable
Melting point/range	:	-11°C (12°F) at 103,25 hPa Information given is based on data obtained from similar substances.
Freezing point		No data available
Boiling point/boiling range	:	172-180°C (342-356°F) (5%-50%), Decomposes
Vapor pressure	:	15,60 Pa at 20°C (68°F) Information given is based on data obtained from similar substances.
Density	:	1,0697 G/ML at 20°C (68°F)
Water solubility	:	Insoluble
Partition coefficient: n-octanol/water	:	log Pow: 5,6 Information given is based on data obtained from similar substances.
Solubility in other solvents	:	Soluble in hexane and white spirits.
Viscosity, dynamic	:	10 cP at 20°C (68°F)
Relative vapor density	:	1 (Air = 1.0)
Evaporation rate	:	Not applicable
Percent volatile	:	> 99 %

9.2

Other information

Conductivity	:	No data available

SECTION 10: Stability and reactivity

10.1

Reactivity	:	Stable under recommended storage conditions.

10.2

Chemical stability	:	This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3

Possibility of hazardous reactions

Hazardous reactions : Hazardous reactions: Hazardous polymerization does not occur.

10.4

Conditions to avoid : No data available.

Thermal decomposition : 144 °C

10.6

Hazardous decomposition products : Carbon oxides
Sulfur oxides

Other data : No decomposition if stored and applied as directed.

SECTION 11: Toxicological information

11.1

Information on toxicological effects

Acute oral toxicity

Di-tert-butyl Polysulfide : LD50: > 2.000 mg/kg
Species: Rat
Sex: male and female
Method: OECD Test Guideline 401
Information given is based on data obtained from similar substances.

Acute dermal toxicity

Di-tert-butyl Polysulfide : LD50: > 2.000 mg/kg
Sex: male and female
Method: OECD Test Guideline 402
Information given is based on data obtained from similar substances.

Di-tert-Butyl Polysulfide (TBPS 454)
Skin irritation : May cause skin irritation and/or dermatitis.

Di-tert-Butyl Polysulfide (TBPS 454)
Eye irritation : Vapors may cause irritation to the eyes, respiratory system and the skin.

Di-tert-Butyl Polysulfide (TBPS 454)
Sensitization : Causes sensitization.

Repeated dose toxicity

Di-tert-butyl Polysulfide : Species: Rat
Application Route: Oral
NOEL: 100 mg/kg
Method: OECD Test Guideline 407

Target Organs: Blood
Information given is based on data obtained from similar substances.

Genotoxicity in vitro

Di-tert-butyl Polysulfide : Test Type: Ames test
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

Test Type: Mouse lymphoma assay
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: positive

Genotoxicity in vivo

Di-tert-butyl Polysulfide : Test Type: In vivo micronucleus test
Species: Mouse
Cell type: Bone marrow
Route of Application: Oral
Exposure time: 2 d
Dose: 2000 mg/kg/d
Method: OECD Test Guideline 474
Result: negative

Reproductive toxicity

Di-tert-butyl Polysulfide : Species: Rat
Sex: male and female
Application Route: Oral
Method: OECD Guideline 421
Fertility and developmental toxicity tests did not reveal any effect on reproduction.
Information given is based on data obtained from similar substances.

Di-tert-Butyl Polysulfide (TBPS 454)
Aspiration toxicity : No aspiration toxicity classification.

CMR effects

Di-tert-butyl Polysulfide : Carcinogenicity: Not available
Teratogenicity: Animal testing did not show any effects on fetal development.
Reproductive toxicity: Animal testing did not show any effects on fertility.

11.2
Information on other hazards

Di-tert-Butyl Polysulfide (TBPS 454)
Further information : No data available.

Endocrine disrupting properties	:	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 12: Ecological information

12.1

Toxicity

Toxicity to fish

Di-tert-butyl Polysulfide	:	LC50: > 0,088 mg/l Exposure time: 96 h static test Analytical monitoring: yes Method: OECD Test Guideline 203 No toxicity at the limit of solubility. Information given is based on data obtained from similar substances.

Toxicity to daphnia and other aquatic invertebrates

Di-tert-butyl Polysulfide	:	EC50: 0,24 mg/l Exposure time: 48 h Species: Daphnia magna (Water flea) static test Analytical monitoring: yes Method: OECD Test Guideline 202 Information given is based on data obtained from similar substances.

Toxicity to algae

Di-tert-butyl Polysulfide	:	EC50: 0,838 mg/l Exposure time: 96 h Species: Pseudokirchneriella subcapitata (microalgae) static test Analytical monitoring: yes Method: OECD Test Guideline 201 Information given is based on data obtained from similar substances.

M-Factor

Polysulfides, di-tert-Bu	:	M-Factor (Acute Aquat. Tox.)	1
		M-Factor (Chron. Aquat. Tox.)	1

Toxicity to bacteria

Di-tert-butyl Polysulfide	:	NOEC: 45,1 mg/l Respiration inhibition

12.2

Persistence and degradability

Biodegradability

Di-tert-butyl Polysulfide : aerobic
Result: Not readily biodegradable.
13 %
Testing period: 28 d
Method: OECD Test Guideline 301B
Information given is based on data obtained from similar substances.

12.3
Bioaccumulative potential

Bioaccumulation

Di-tert-butyl Polysulfide : Species: Lepomis macrochirus (Bluegill sunfish)
Exposure time: 14 d
Temperature: 22 °C
Bioconcentration factor (BCF): 188
Method: OECD Test Guideline 305
Does not bioaccumulate.

12.4
Mobility in soil

Mobility

Di-tert-butyl Polysulfide : No data available

12.5
Results of PBT and vPvB assessment

Results of PBT assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6
Endocrine disrupting properties

Endocrine disrupting properties : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7
Other adverse effects

Additional ecological information : Very toxic to aquatic life with long lasting effects.

12.8
Additional Information

Ecotoxicology Assessment

Short-term (acute) aquatic hazard
Di-tert-butyl Polysulfide : Very toxic to aquatic life.

Long-term (chronic) aquatic hazard
Di-tert-butyl Polysulfide : Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1

Waste treatment methods

The information in this SDS pertains only to the product as shipped.

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

Product	:	The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.
Contaminated packaging	:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers.

For additional details, see the Exposure Scenario in the Annex portion

SECTION 14: Transport information

14.1 - 14.7

Transport information

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the SDS and the bill of lading.

US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., (DI-TERT-BUTYL POLYSULFIDE), 9, III

IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., (DI-TERT-BUTYL POLYSULFIDE), 9, III, (103 °C c.c.), MARINE POLLUTANT, (DI-TERT-BUTYL POLYSULFIDE)

IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., (DI-TERT-BUTYL POLYSULFIDE), 9, III

ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., (DI-TERT-BUTYL POLYSULFIDE), 9, III, (-)

RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))

90,UN3082,ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., (DI-TERT-BUTYL POLYSULFIDE), 9, III

ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS)

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., (DI-TERT-BUTYL POLYSULFIDE), 9, III

Maritime transport in bulk according to IMO instruments

SECTION 15: Regulatory information

15.1

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

Commission Regulation (EU) 2020/878 of 18 June 2020 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

Water hazard class (Germany) : WGK 2 water endangering
Classification according to appendix 3

15.2

Chemical Safety Assessment

Components : Polysulfides, di-tert-Bu 273-103-3

Major Accident Hazard Legislation : 96/82/EC Update: 2003
Dangerous for the environment
9a
Quantity 1: 100 t
Quantity 2: 200 t

: ZEU_SEVES3 Update:
ENVIRONMENTAL HAZARDS
E1
Quantity 1: 100 t
Quantity 2: 200 t

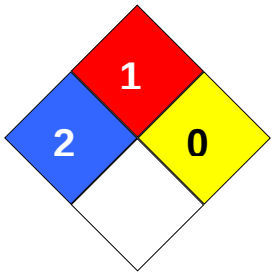
Notification status

Europe REACH	:	This product is in full compliance according to REACH regulation 1907/2006/EC.
Switzerland CH INV	:	On the inventory, or in compliance with the inventory
United States of America (USA) TSCA	:	On or in compliance with the active portion of the TSCA inventory

Canada DSL	:	All components of this product are on the Canadian DSL
Australia AIIC	:	On the inventory, or in compliance with the inventory
New Zealand NZIoC	:	Not in compliance with the inventory
Japan ENCS	:	Not in compliance with the inventory
Korea KECI	:	A substance(s) in this product was not registered, notified to be registered, or exempted from registration by CPChem according to K-REACH regulations. Importation or manufacture of this product is still permitted provided the Korean Importer of Record has themselves notified the substance or the exported amount does not exceed the minimum threshold quantity of the non-registered substance(s).
Philippines PICCS	:	On the inventory, or in compliance with the inventory
Taiwan TCSI	:	On the inventory, or in compliance with the inventory
China IECSC	:	On the inventory, or in compliance with the inventory

SECTION 16: Other information

NFPA Classification : Health Hazard: 2
Fire Hazard: 1
Reactivity Hazard: 0



Further information

Legacy SDS Number : 627080

Significant changes since the last version are highlighted in the margin. This version replaces all previous versions.

The information in this SDS pertains only to the product as shipped.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AIIC	Australian Inventory of Industrial Chemicals	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect

			Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%	ATE	Acute toxicity estimate

Full text of H-Statements referred to under sections 2 and 3.

H317	May cause an allergic skin reaction.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Annex

1. Short title of Exposure Scenario: **Manufacture**

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Process category	:	**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 **PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
Environmental release category	:	**ERC1:** Manufacture of substances
Further information	:	not determined

2.1 Contributing scenario controlling environmental exposure for:ERC1: Manufacture of substances

Amount used

Annual amount per site	:	900 tonnes/year

Environment factors not influenced by risk management

Flow rate	:	390.000 m3/d

Other given operational conditions affecting environmental exposure

Initial release factor		
Number of emission days per year	:	53
Emission or Release Factor: Air	:	0,0003 %
Emission or Release Factor: Water	:	0,0003 %
Final release factor		
Emission or Release Factor: Air	:	0,0003 %
Emission or Release Factor: Water	:	0,0003 %
Emission or Release Factor: Soil	:	0 %
Local release rate: Water	:	0,051 kg/day
Remarks	:	There is no direct release of the substance to waste water. Equipment cleaning water containing the substance is collected as waste for incineration. Therefore, the release estimate and exposure calculations reported here only relate to the waste treatment process.
Local release rate: Air	:	0,051 kg/day
Remarks	:	There is no direct release of the substance to air, as air emission abatement equipment such as an incinerator is used at the manufacturing site. Therefore, the release estimate and exposure calculations reported here only relate to/are treated as releases from the waste treated process.

Local release rate: Soil	:	
Remarks	:	There is no direct exposure to soil.

Technical conditions and measures / Organizational measures

Air	:	Release fraction to air from incineration (Effectiveness: 0,01 %)
Water	:	Release fraction to water from incineration (Effectiveness: 0,01 %)

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	Municipal sewage treatment plant
Flow rate of sewage treatment plant effluent	:	1.000 m3/d
Effectiveness (of a measure)	:	91,56 %
Sludge Treatment	:	Agricultural soil, Not applicable

Conditions and measures related to external treatment of waste for disposal

Waste treatment	:	No
Remarks	:	Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.

Conditions and measures related to external recovery of waste

Recovery Methods	:	Releases to waste (Effectiveness: 3 %)

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Physical Form (at time of use)	:	Liquid substance
Vapor pressure	:	< 0,5 kPa
Process Temperature	:	<= 50 °C

Frequency and duration of use

Exposure duration	:	< 8 h

Human factors not influenced by risk management

Exposed skin area	:	One hand face only (240 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures

Closed system (minimal contact during routine operations)
Local exhaust ventilation- inhalation:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 95 %)

2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics

Physical Form (at time of use)	:	Liquid substance

Vapor pressure : < 0,5 kPa
Process Temperature : <= 50 °C

Frequency and duration of use
Exposure duration : < 8 h

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures
Closed continuous process with occasional controlled exposure
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)
Local exhaust ventilation-dermal:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 95 %)

Respiratory Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics
Physical Form (at time of use) : Liquid substance
Vapor pressure : < 0,5 kPa
Process Temperature : <= 50 °C

Frequency and duration of use
Exposure duration : < 8 h

Human factors not influenced by risk management
Exposed skin area : One hand face only (240 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures
Closed batch process with occasional controlled exposure.
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)
Local exhaust ventilation-dermal:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 95 %)

Respiratory Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics

Physical Form (at time of use)	:	Liquid substance
Vapor pressure	:	< 0,5 kPa

Frequency and duration of use

Exposure duration	:	< 8 h

Human factors not influenced by risk management

Exposed skin area	:	Two hands (960 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Good general ventilation (3-5 air changes per hour)

Technical conditions and measures

Containment measures, No
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)
Local exhaust ventilation-dermal:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 95 %)

Respiratory Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Product characteristics

Physical Form (at time of use)	:	Liquid substance
Vapor pressure	:	< 0,5 kPa
Process Temperature	:	<= 40 °C

Frequency and duration of use

Exposure duration	:	< 8 h

Human factors not influenced by risk management

Exposed skin area	:	Two hands (960 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures

Semi-closed process with occasional controlled exposure
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 95 %)
Local exhaust ventilation-dermal:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 95 %)

Respiratory Protection, No (Effectiveness: 0 %)

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterization ratio (PEC/PNEC):
ERC1	EUSES		Freshwater		0,000011 mg/L	0,045
			Freshwater sediment		0,0041 mg/kg dry weight (d.w.)	0,0025
			Marine water		0,0000043 mg/L	0,18
			Marine sediment		0,0016 mg/kg dry weight (d.w.)	0,0097
			Agricultural soil		0,00004 mg/kg dry weight (d.w.)	0,022
			Sewage treatment plant		0,00043 mg/L	0,000095

ERC1: Manufacture of substances

Workers/Consumers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterization ratio (PEC/PNEC):
PROC1, CS15	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	0,114 mg/m3	< 0,01
			Worker – dermal, long-term – systemic	0,002 mg/kg bw/day	< 0,01
			Worker – long-term – systemic Combined routes		< 0,01
PROC2, CS15	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	1,144 mg/m3	0,079
			Worker – dermal, long-term – systemic	0,068 mg/kg bw/day	0,021
			Worker – long-term – systemic Combined routes		0,099
PROC3, CS15, CS37	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	3,432 mg/m3	0,237
			Worker – dermal, long-term – systemic	0,034 mg/kg bw/day	0,01
			Worker – long-term – systemic Combined routes		0,247
PROC8a, CS22, CS63, CS82	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	8,007 mg/m3	0,552
			Worker – dermal, long-term – systemic	0,686 mg/kg bw/day	0,206
			Worker – long-term – systemic Combined routes		0,758
PROC8b, CS22, CS63, CS81	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	2,86 mg/m3	0,197

			Worker – dermal, long-term – systemic	0,686 mg/kg bw/day	0,206
			Worker – long-term – systemic Combined routes		0,403

PROC1: Use in closed process, no likelihood of exposure
CS15: General exposures (closed systems)

PROC2: Use in closed, continuous process with occasional controlled exposure
CS15: General exposures (closed systems)

PROC3: Use in closed batch process (synthesis or formulation)
CS15: General exposures (closed systems)
CS37: Use in contained batch processes

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
CS22: Transfer from/pouring from containers
CS63: Vessel / container
CS82: Non-dedicated facility

PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
CS22: Transfer from/pouring from containers
CS63: Vessel / container
CS81: Dedicated facility

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

1. Short title of Exposure Scenario: **Use as an intermediate**

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	:	**SU8, SU9:** Manufacture of bulk, large scale chemicals (including petroleum products), Manufacture of fine chemicals
Process category	:	**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 **PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
Environmental release category	:	**ERC6a:** Industrial use resulting in manufacture of another substance (use of intermediates)
Further information	:	not determined

2.1 Contributing scenario controlling environmental exposure for:ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

Amount used

Annual amount per site	:	800 tonnes/year

Environment factors not influenced by risk management

Flow rate	:	390.000 m3/d

Other given operational conditions affecting environmental exposure

Initial release factor		
Number of emission days per year	:	300
Emission or Release Factor: Air	:	0,0005 %
Emission or Release Factor: Water	:	0,0005 %
Final release factor		
Emission or Release Factor: Air	:	0,0005 %
Emission or Release Factor: Water	:	0,0005 %
Emission or Release Factor: Soil	:	0 %
Local release rate: Water	:	0,013 kg/day
Remarks	:	There is no direct release of the substance to waste water. Equipment cleaning water containing the substance is collected as waste for incineration. Therefore, the release estimate and exposure calculations reported here only relate to the waste treatment process.
Local release rate: Air	:	0,013 kg/day
Remarks	:	There is no direct release of the substance to air, as air emission abatement equipment such as an incinerator is used at the manufacturing site. Therefore, the release estimate and exposure calculations reported here only relate to/are treated as releases from the waste treated process.
Local release rate: Soil	:	
Remarks	:	There is no direct exposure to soil.

Technical conditions and measures / Organizational measures

Air	:	Release fraction to air from incineration (Effectiveness: 0,01 %)
Water	:	Release fraction to water from incineration (Effectiveness: 0,01 %)

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	Municipal sewage treatment plant
Flow rate of sewage treatment plant effluent	:	1.000 m3/d
Effectiveness (of a measure)	:	91,56 %
Sludge Treatment	:	Agricultural soil, Not applicable

Conditions and measures related to external treatment of waste for disposal

Waste treatment	:	No
Remarks	:	ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.

Conditions and measures related to external recovery of waste

Recovery Methods	:	Releases to waste (Effectiveness: 5 %)

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Physical Form (at time of use)	:	Liquid substance
Vapor pressure	:	< 0,5 kPa
Process Temperature	:	<= 40 °C

Frequency and duration of use

Exposure duration	:	< 8 h

Human factors not influenced by risk management

Exposed skin area	:	One hand face only (240 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures

Closed system (minimal contact during routine operations)
Local exhaust ventilation- inhalation:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 90 %)
Respiratory Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics

Physical Form (at time of use)	:	Liquid substance
Vapor pressure	:	< 0,5 kPa
Process Temperature	:	<= 40 °C

Frequency and duration of use

Exposure duration	:	< 8 h

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures

Closed continuous process with occasional controlled exposure
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)
Local exhaust ventilation-dermal:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 90 %)
Respiratory Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics

Physical Form (at time of use)	:	Liquid substance
Vapor pressure	:	< 0,5 kPa
Process Temperature	:	<= 40 °C

Frequency and duration of use

Exposure duration	:	< 8 h

Human factors not influenced by risk management

Exposed skin area	:	One hand face only (240 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures

Closed continuous process with occasional controlled exposure
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)
Local exhaust ventilation-dermal:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 90 %)
Respiratory Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics

Physical Form (at time of use)	:	Liquid substance
Vapor pressure	:	< 0,5 kPa
Process Temperature	:	<= 40 °C

Frequency and duration of use

Exposure duration	:	< 8 h

Human factors not influenced by risk management

Exposed skin area	:	Two hands (960 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Good general ventilation (3-5 air changes per hour)

Technical conditions and measures

Containment measures, None
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)
Local exhaust ventilation-dermal:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 95 %)
Respiratory Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Product characteristics
Physical Form (at time of use) : Liquid substance
Vapor pressure : < 0,5 kPa

Frequency and duration of use
Exposure duration : < 8 h

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures
Semi-closed process with occasional controlled exposure
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 95 %)
Local exhaust ventilation-dermal:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 95 %)
Respiratory Protection, No (Effectiveness: 0 %)

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterization ratio (PEC/PNEC):
ERC6a	EUSES		Freshwater		0,0000029 mg/L	0,012
			Freshwater sediment		0,0011 mg/kg dry weight (d.w.)	0,00066
			Marine water		0,0000011 mg/L	0,047
			Marine sediment		0,00043 mg/kg dry weight (d.w.)	0,0026
			Agricultural soil		0,000059 mg/kg dry weight (d.w.)	0,032

ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

Workers/Consumers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterization ratio (PEC/PNEC):
PROC1, CS15	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	0,114 mg/m3	< 0,01
			Worker – dermal, long-term – systemic	0,003 mg/kg bw/day	< 0,01
			Worker – long-term – systemic Combined routes		< 0,01
PROC2, CS15	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	1,144 mg/m3	0,079
			Worker – dermal, long-term – systemic	0,137 mg/kg bw/day	0,041
			Worker – long-term – systemic Combined routes		0,12
PROC3, CS15, CS37	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	3,432 mg/m3	0,237
			Worker – dermal, long-term – systemic	0,069 mg/kg bw/day	0,021
			Worker – long-term – systemic Combined routes		0,257
PROC8a, CS22, CS63, CS82	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	8,007 mg/m3	0,552
			Worker – dermal, long-term – systemic	0,686 mg/kg bw/day	0,206
			Worker – long-term – systemic Combined routes		0,758
PROC8b, CS22, CS63, CS81	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	2,86 mg/m3	0,197
			Worker – dermal, long-term – systemic	0,686 mg/kg bw/day	0,206
			Worker – long-term – systemic Combined routes		0,403

PROC1: Use in closed process, no likelihood of exposure
CS15: General exposures (closed systems)

PROC2: Use in closed, continuous process with occasional controlled exposure
CS15: General exposures (closed systems)

PROC3: Use in closed batch process (synthesis or formulation)
CS15: General exposures (closed systems)
CS37: Use in contained batch processes

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
CS22: Transfer from/pouring from containers
CS63: Vessel / container
CS82: Non-dedicated facility

PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
CS22: Transfer from/pouring from containers
CS63: Vessel / container
CS81: Dedicated facility

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

1. Short title of Exposure Scenario: **Formulation**

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	:	**SU 10:** Formulation [mixing] of preparations and/ or re-packaging (excluding alloys)
Process category	:	**PROC1:** Use in closed process, no likelihood of exposure **PROC2:** Use in closed, continuous process with occasional controlled exposure **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) **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 category	:	**ERC2:** Formulation of preparations
Further information	:	not determined

2.1 Contributing scenario controlling environmental exposure for:ERC2: Formulation of preparations

Amount used

Annual amount per site	:	20 tonnes/year
(Msafe)	:	0,29 tonnes/day

Environment factors not influenced by risk management

Flow rate	:	390.000 m3/d

Other given operational conditions affecting environmental exposure

Initial release factor		
Number of emission days per year	:	100
Emission or Release Factor: Air	:	0,1 %
Emission or Release Factor: Water	:	0,1 %
Final release factor		
Emission or Release Factor: Air	:	0,1 %
Emission or Release Factor: Water	:	0,1 %
Emission or Release Factor: Soil	:	0 %
Local release rate: Water	:	0,2 kg/day
Remarks	:	There is no direct release of the substance to waste water. Equipment cleaning water containing the substance is collected as waste for incineration. Therefore, the release estimate and exposure calculations reported here only relate to the waste treatment process.
Local release rate: Air	:	0,2 kg/day
Remarks	:	There is no direct release of the substance to air, as air emission abatement equipment such as an incinerator is used at the manufacturing site. Therefore, the release estimate and

exposure calculations reported here only relate to/are treated as releases from the waste treated process.

Local release rate: Soil :
Remarks : There is no direct exposure to soil.

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : Municipal sewage treatment plant
Flow rate of sewage treatment plant effluent : 1.000 m3/d
Effectiveness (of a measure) : 91,56 %
Sludge Treatment : Agricultural soil, Not applicable

Conditions and measures related to external treatment of waste for disposal

Waste treatment : No
Remarks : ERC based assessment demonstrating control of risk with default conditions.
Low risk assumed for waste life stage.
Waste disposal according to national/local legislation is sufficient.

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Physical Form (at time of use) : Liquid substance
Vapor pressure : < 0,5 kPa
Process Temperature : <= 40 °C

Frequency and duration of use

Exposure duration : < 8 h

Human factors not influenced by risk management

Exposed skin area : One hand face only (240 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
Remarks : Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures

Closed system (minimal contact during routine operations)
Local exhaust ventilation- inhalation:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 90 %)
Respiratory Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics

Physical Form (at time of use) : Liquid substance
Vapor pressure : < 0,5 kPa

Process Temperature : <= 40 °C

Frequency and duration of use
Exposure duration : < 8 h

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures
Closed continuous process with occasional controlled exposure
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)
Local exhaust ventilation-dermal:, No

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)
Respiratory Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

Product characteristics
Physical Form (at time of use) : Liquid substance
Vapor pressure : < 0,5 kPa
Process Temperature : <= 40 °C

Frequency and duration of use
Exposure duration : < 8 h

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures
Semi-closed process with occasional controlled exposure
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)
Local exhaust ventilation-dermal:, No

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)
Respiratory Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)

Product characteristics
Physical Form (at time of use) : Liquid substance
Vapor pressure : < 0,5 kPa
Process Temperature : <= 40 °C

Frequency and duration of use
Exposure duration : < 8 h

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures
Containment measures, None
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)
Local exhaust ventilation-dermal:, No

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)
Respiratory Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics
Physical Form (at time of use) : Liquid substance
Vapor pressure : < 0,5 kPa
Process Temperature : <= 40 °C

Frequency and duration of use
Exposure duration : < 8 h

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures
Semi-closed process with occasional controlled exposure
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)
Local exhaust ventilation-dermal:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)
Respiratory Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b: Transfer of

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

Product characteristics
Physical Form (at time of use) : Liquid substance
Vapor pressure : < 0,5 kPa
Process Temperature : <= 40 °C

Frequency and duration of use
Exposure duration : < 8 h

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures
Semi-closed process with occasional controlled exposure
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 95 %)
Local exhaust ventilation-dermal:, No

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)
Respiratory Protection, No (Effectiveness: 0 %)

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterization ratio (PEC/PNEC):
ERC2	EUSES		Freshwater		0,000042 mg/L	0,7
			Freshwater sediment		0,016 mg/kg dry weight (d.w.)	0,0095
			Marine water		0,000017 mg/L	0,7
			Marine sediment		0,0064 mg/kg dry weight (d.w.)	0,038
			Agricultural soil		0,00029 mg/kg dry weight (d.w.)	0,16
			Sewage treatment plant		0,0017 mg/L	0,000037

ERC2: Formulation of preparations

Workers/Consumers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterization ratio (PEC/PNEC):
PROC1, CS15	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	0,114 mg/m3	< 0,01

			Worker – dermal, long-term – systemic	0,003 mg/kg bw/day	< 0,01
			Worker – long-term – systemic Combined routes		< 0,01
PROC2, CS15	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	1,144 mg/m3	0,079
			Worker – dermal, long-term – systemic	0,137 mg/kg bw/day	0,041
			Worker – long-term – systemic Combined routes		0,12
PROC4, CS55	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	5,719 mg/m3	0,394
			Worker – dermal, long-term – systemic	0,686 mg/kg bw/day	0,206
			Worker – long-term – systemic Combined routes		0,6
PROC5, CS55	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	5,719 mg/m3	0,394
			Worker – dermal, long-term – systemic	1,371 mg/kg bw/day	0,412
			Worker – long-term – systemic Combined routes		0,806
PROC9, CS22, CS63	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	5,719 mg/m3	0,394
			Worker – dermal, long-term – systemic	0,686 mg/kg bw/day	0,206
			Worker – long-term – systemic Combined routes		0,6
PROC8b, CS22, CS63	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	2,86 mg/m3	0,197
			Worker – dermal, long-term – systemic	1,371 mg/kg bw/day	0,412
			Worker – long-term – systemic Combined routes		0,609

PROC1: Use in closed process, no likelihood of exposure
CS15: General exposures (closed systems)

PROC2: Use in closed, continuous process with occasional controlled exposure
CS15: General exposures (closed systems)

PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
CS55: Batch process

PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)
CS55: Batch process

PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
CS22: Transfer from/pouring from containers
CS63: Vessel / container

PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
CS22: Transfer from/pouring from containers
CS63: Vessel / container

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set

by the Exposure Scenario

1. Short title of Exposure Scenario: **Lubricants - Industrial**

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	:	**SU0:** Other
Process category	:	**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 category	:	**ERC7:** Industrial use of substances in closed systems
Further information	:	not determined

2.1 Contributing scenario controlling environmental exposure for:ERC7: Industrial use of substances in closed systems

Amount used

Annual amount per site	:	8 tonnes/year
(Msafe)	:	0,057 tonnes/day

Environment factors not influenced by risk management

Flow rate	:	18.000 m3/d

Other given operational conditions affecting environmental exposure

Initial release factor		
Number of emission days per year	:	200
Emission or Release Factor: Air	:	0,1 %
Emission or Release Factor: Water	:	0,1 %
Final release factor		
Emission or Release Factor: Air	:	0,1 %
Emission or Release Factor: Water	:	0,1 %
Emission or Release Factor: Soil	:	0 %
Local release rate: Water	:	0,04 kg/day
Remarks	:	In the absence of specific information on the use of lubricants containing the substance, a generic release factor of 1E-03 is considered to be a reasonable estimate of release of the substance to water from industrial lubricants
Local release rate: Air	:	0,04 kg/day
Remarks	:	In the absence of specific information on the use of lubricants containing the substance, a generic release factor of 1E-03 is considered to be a reasonable estimate of release of the substance to air from industrial lubricants.
Local release rate: Soil	:	
Remarks	:	There is no direct exposure to soil.

Technical conditions and measures / Organizational measures

Air	:	Release fraction to air from incineration (Effectiveness: 0,01 %)

Water	:	Release fraction to water from incineration (Effectiveness: 0,01 %)

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	Municipal sewage treatment plant
Flow rate of sewage treatment plant effluent	:	1.000 m3/d
Effectiveness (of a measure)	:	91,56 %
Sludge Treatment	:	Agricultural soil, Not applicable

Conditions and measures related to external treatment of waste for disposal

Waste treatment	:	No
Remarks	:	Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.

2.2 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Product characteristics

Physical Form (at time of use)	:	Liquid substance
Vapor pressure	:	< 0,5 kPa
Process Temperature	:	<= 40 °C

Frequency and duration of use

Exposure duration	:	< 8 h

Human factors not influenced by risk management

Exposed skin area	:	Two hands (960 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures

Semi-closed process with occasional controlled exposure
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 95 %)
Local exhaust ventilation-dermal:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 90 %)
Respiratory Protection, No

2.2 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics

Physical Form (at time of use)	:	Liquid substance
Vapor pressure	:	< 0,5 kPa
Process Temperature	:	<= 40 °C

Frequency and duration of use

Exposure duration	:	< 8 h

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Basic general ventilation (1-3 air changes per hour)

Technical conditions and measures
Semi-closed process with occasional controlled exposure
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)
Local exhaust ventilation-dermal:, No (Effectiveness: 0 %)

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

Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)
Respiratory Protection, No

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterization ratio (PEC/PNEC):
ERC7	EUSES		Freshwater		0,00017 mg/L	0,7
			Freshwater sediment		0,064 mg/kg dry weight (d.w.)	0,038
			Marine water		0,000017 mg/L	0,7
			Marine sediment		0,0064 mg/kg dry weight (d.w.)	0,038
			Agricultural soil		0,00012 mg/kg dry weight (d.w.)	0,065
			Sewage treatment plant		0,0017 mg/L	0,00037

ERC7: Industrial use of substances in closed systems

Workers/Consumers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterization ratio (PEC/PNEC):
PROC8b, CS22, CS63	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	1,716 mg/m3	0,118
			Worker – dermal, long-term – systemic	0,823 mg/kg bw/day	0,247
			Worker – long-term – systemic Combined routes		0,365
PROC9, CS22, CS63	ECETOC TRA Modified		Worker – inhalation, long-term – systemic	3,432 mg/m3	0,237
			Worker – dermal, long-term – systemic	0,412 mg/kg bw/day	0,124
			Worker – long-term – systemic Combined routes		0,36

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

containers at dedicated facilities
CS22: Transfer from/pouring from containers
CS63: Vessel / container

PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
CS22: Transfer from/pouring from containers
CS63: Vessel / container

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario