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

1.1 Product identifier

Trade name/designation	Hydrogen fluoride
Art-Nr(n).	3100
Substance name	hydrogen fluoride
INDEX No.	009-002-00-6
EC No.	231-634-8
REACH No.	01-2119458860-33
CAS No.	7664-39-3

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

Sector of uses [SU]
SU2a Mining, (without offshore industries)
SU3 Industrial uses
SU8 Manufacture of bulk, large scale chemicals (including petroleum products)
SU9 Manufacture of fine chemicals
SU10 Formulation [mixing] of preparations and/or re-packaging (excluding alloys)
SU14 Manufacture of basic metals, including alloys
SU15 Manufacture of fabricated metal products, except machinery and equipment
SU19 Building and construction work
SU22 Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Process categories [PROC]
PROC1 Use in closed process, no likelihood of exposure
PROC2 Use in closed, continuous process with occasional controlled exposure
PROC3 Use in closed batch process (synthesis or formulation)
PROC4 Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5 Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC7 Industrial spraying
PROC8a Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9 Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC13 Treatment of articles by dipping and pouring
PROC15 Use as laboratory reagent
PROC19 Manual activities involving hand contact

Environmental release categories [ERC]
ERC2 Formulation into mixture
ERC4 Industrial use of processing aids in processes and products, not becoming part of articles
ERC5 Use at industrial site leading to inclusion into/onto article
ERC6a Industrial use resulting in manufacture of another substance (use of intermediates)
ERC6b Industrial use of reactive processing aids
ERC7 Use of functional fluid at industrial site
ERC8a Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)
ERC8b Widespread use of reactive processing aid (no inclusion into or onto article, indoor)

Product Categories [PC]
PC14 Metal surface treatment products
PC15 Non-metal-surface treatment products
PC19 Intermediate (precursor)
PC20 Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents
PC21 Laboratory chemicals
PC35 Washing and cleaning products
PC40 Extraction agents

1.3 Details of the supplier of the safety data sheet

Supplier
GHC Gerling, Holz & Co. Handels GmbH
Ruhrstraße 113
D-22761 Hamburg
Telephone +49 40 853 123 0
E-mail hamburg@ghc.de
Website www.ghc.com

Department responsible for information:
GHC Gerling, Holz & Co. Handels GmbH
Telephone +49 40 853 123 0

E-mail (competent person):
msds@ghc.de

*** 1.4 Emergency telephone number**

EN: Poison Information Center Mainz +49 6131 19240

* SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP]	Classification procedure
Acute Tox. 2, H300	
Acute Tox. 1, H310	
Acute Tox. 2, H330	
Skin Corr. 1A, H314	

Hazard statements for health hazards
H300 Fatal if swallowed.
H310 Fatal in contact with skin.
H314 Causes severe skin burns and eye damage.
H330 Fatal if inhaled.

*** 2.2 Label elements**

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

Hazard pictograms

GHS05

GHS06

Signal word
Danger

Hazard statements
H300 Fatal if swallowed.
H310 Fatal in contact with skin.
H314 Causes severe skin burns and eye damage.
H330 Fatal if inhaled.

* **Precautionary statements**
P260 Do not breathe gas/vapours.
P280 Wear protective gloves/protective clothing and eye protection/face protection.
P310 Immediately call a POISON CENTER/doctor.
P302 + P352 IF ON SKIN: Wash with plenty of water and soap.
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P403 Store in a well-ventilated place.
P405 Store locked up.

Supplemental hazard information
EUH071 Corrosive to the respiratory tract.

*** 2.3 Other hazards**

* **Adverse human health effects and symptoms**
Dangerous substances are released in case of decomposition.

* **Other adverse effects**
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.

* **Results of PBT and vPvB assessment**
The substance/mixture does not contain components meeting the PBT/vPvB criteria of the Reach Regulation, Annex XIII, at levels of 0.1% or higher.

* SECTION 3: Composition / information on ingredients

* 3.1 Substances

Substance name	hydrogen fluoride
INDEX No.	009-002-00-6
EC No.	231-634-8
REACH No.	01-2119458860-33
CAS No.	7664-39-3
ATE	ATE(inhalation gas): 2240 ppm

* **Additional information**
Content: >= 99 %

* 3.2 Mixtures

not applicable

* SECTION 4: First aid measures

* 4.1 Description of first aid measures

* **General information**
Remove contaminated, saturated clothing immediately.
First aider: Pay attention to self-protection!
Call a physician immediately.
Symptoms may develop several hours following exposure; medical observation therefore necessary for at least 48 hours.

* **Following inhalation**
Remove casualty to fresh air and keep warm and at rest.
In the event of pulmonary irritation treat initially with corticoid spray, e.g. Ventolair- or Pulmicort- metered-dose aerosol (Ventolair and Pulmicort are registrated trademarks).
In case of respiratory standstill give artificial respiration by respiratory bag (Ambu bag) or respirator. Obtain medical assistance.

* **Following skin contact**
After contact with skin, wash immediately with plenty of water and soap.
Immediate medical treatment required because corrosive injuries that are not treated are hard to cure.
In case of skin contact, wearing rubber gloves rub 2.5% calcium gluconate gel continuously into the affected area for 1.5 hours or until further medical care is available.

* **After eye contact**
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical assistance.

Following ingestion
Ingestion is not considered a potential route of exposure.

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

* **Symptoms**
Cardiopulmonary arrest.
Corrosion
Cardiac arrhythmias
Strong eye irritation.
Vomiting
Shortness of breath.

* **Effects**
Pulmonary oedema

4.3 Indication of any immediate medical attention and special treatment needed

Notes for the doctor
Subsequent observance for pneumonia and lung oedema.
In case of skin contact, wearing rubber gloves rub 2.5% calcium gluconate gel continuously into the affected area for 1.5 hours or until further medical care is available.
To supervise the blood circulation.

* SECTION 5: Firefighting measures

* 5.1 Extinguishing media

* **Suitable extinguishing media**
The product itself does not burn. The product itself does not burn. Match extinguishing measures to surrounding fire.
Extinguishing powder
Foam
Carbon dioxide (CO_2)

Unsuitable extinguishing media
Full water jet

* 5.2 Special hazards arising from the substance or mixture

* **Hazardous combustion products**
Hydrogen

* 5.3 Advice for firefighters

* **Special protective equipment for firefighters**
Wear a self-contained breathing apparatus and chemical protective clothing.

* **Additional information**
If possible, shut off gas valves and move containers to a safe location.
Use water spray jet to protect personnel and to cool endangered containers.
Exposure to fire may cause rupture / explosion of the containers.
Dispose of fire residues and contaminated extinguishing water in accordance with local, official regulations.

* SECTION 6: Accidental release measures

* 6.1 Personal precautions, protective equipment and emergency procedures

* **For non-emergency personnel**
Use personal protection equipment.
Leave the danger area.
Keep people away and stay on the upwind side.

For emergency responders
Personal protection by wearing close-fitting protective clothing and breathing apparatus.
Wear acid-resistent boots.
Remove persons to safety.

* 6.2 Environmental precautions

If possible, stop flow of product.
Do not allow to enter into soil/subsoil.
Do not allow to enter into surface water or drains.

* 6.3 Methods and material for containment and cleaning up

* **For containment**
If necessary, secure leaky pressure receptacles using a salvage container.
Limit expansion of the gas (water spray jet).
Prevent the liquid from spreading over a wide area (set up barriers, cover sewage systems).

For cleaning up
Clean contaminated articles and floor according to the environmental legislation.

Other information
No water on the leaks.

*** 6.4 Reference to other sections**

Disposal: see section 13
Personal protection equipment: see section 8

* SECTION 7: Handling and storage

*** 7.1 Precautions for safe handling**

* **Protective measures**
Use only in well-ventilated areas.
Transfer and handle product only in closed systems.
Usual measures for fire prevention.
Containers' temperature should not be increased above 50 °C.
The working pressure in the receptacle must not exceed the saturation vapour pressure of the pure product resulting at a temperature of 50 °C.
Prevent cylinders from falling over.
Ensure valve outlet cap nut or plug is correctly fitted.
Ensure valve protection device is correctly fitted.
Open valve slowly to avoid pressure shock.
Do not allow backflow into the container.
Entering of water into the container must be prevented.
No water to valves, flanges and other fittings.
Purging of pipes and valves with inert gases - to avoid: water, solvents.

* **Advices on general occupational hygiene**
When using do not eat, drink, smoke, sniff.
Wash hands before breaks and after work.
Remove contaminated clothing and protective equipment before entering eating areas.

*** 7.2 Conditions for safe storage, including any incompatibilities**

* **Requirements for storage rooms and vessels**
All regulations and local requirements for the storage of containers have to be respected.
Keep container tightly closed and in a well-ventilated place.
Containers' temperature should not be increased above 50 °C.
Prevent cylinders from falling over.
Only use containers specifically approved for the substance/product.
Information on suitable materials for receptacles and valves see ISO 11114.

Storage class
2A Gases (except aerosol dispensers and lighters)

* **Materials to avoid**
Do not store together with explosives.
Do not store together with flammable liquids.
Do not store together with flammable solids.
Do not store together with pyrophoric and self-heating substances.
Do not store together with oxidizing liquids or oxidizing solids.
Do not store together with toxic liquids or toxic solids.
Do not store together with infectious substances.
Do not store together with radioactive material.
Do not store together with food or feed.

7.3 Specific end use(s)

Recommendation
See section 1.2
Exposure scenarios (ES) see annex to this safety data sheet.

* SECTION 8: Exposure controls/personal protection

* 8.1 Control parameters

* **Occupational exposure limit values**

CAS No.	EC No.	Substance name	occupational exposure limit value
7664-39-3	231-634-8	Hydrogen fluoride	1,8 [ml/m³(ppm)] 1,5 [mg/m³] Short-term(ml/m³) 3 (1) Short-term(mg/m³) 2,5 (1) (1) 15 minutes reference period (IE)

* **DNEL worker**

CAS No.	Substance name	DNEL value	DNEL type	Remark
7664-39-3	hydrogen fluoride	1.5 mg/m³	long-term inhalative (local)	, repeated dose toxicity.
7664-39-3	hydrogen fluoride	1.5 mg/m³	long-term inhalative (systemic)	, repeated dose toxicity.
7664-39-3	hydrogen fluoride	2.5 mg/m³	acute inhalative (systemic)	, irritation (respiratory trac)
7664-39-3	hydrogen fluoride	2.5 mg/m³	acute inhalative (local)	, irritation (respiratory trac)

* **DNEL Consumer**

CAS No.	Substance name	DNEL value	DNEL type	Remark
7664-39-3	hydrogen fluoride	0.01 mg/kg bw/day	acute – oral, systemic effects	, repeated dose toxicity.
7664-39-3	hydrogen fluoride	0.01 mg/kg bw/day	Long-term – oral, systemic effects	, repeated dose toxicity.
7664-39-3	hydrogen fluoride	0.03 mg/m³	acute inhalative (systemic)	, repeated dose toxicity.
7664-39-3	hydrogen fluoride	0.03 mg/m³	long-term inhalative (systemic)	, repeated dose toxicity.
7664-39-3	hydrogen fluoride	0.2 mg/m³	long-term inhalative (local)	, irritation (respiratory trac)
7664-39-3	hydrogen fluoride	1.25 mg/m³	acute inhalative (local)	, irritation (respiratory trac)

* **PNEC**

CAS No.	Substance name	PNEC Value	PNEC type	Remark
7664-39-3	hydrogen fluoride	0.09 mg/L	aquatic, marine water	Assessment factor 100
7664-39-3	hydrogen fluoride	0.89 mg/L	aquatic, freshwater	Assessment factor 10
7664-39-3	hydrogen fluoride	10.6 mg/kg dw	soil	Assessment factor 10
7664-39-3	hydrogen fluoride	51 mg/L	sewage treatment plant (STP)	Assessment factor 10
7664-39-3	hydrogen fluoride	0.338 mg/kg	sediment, marine water	
7664-39-3	hydrogen fluoride	3.38 mg/kg	sediment, freshwater	

* 8.2 Exposure controls

* Appropriate engineering controls

* **Technical measures to prevent exposure**
Transfer and handle only in enclosed systems.

* Personal protection equipment

* **Eye/face protection**
Protective goggles according to EN 166, in case of increased risk add protective face shield.

Hand protection
Safety gloves according to EN 374:
Glove material specification [type, thickness, permeation time/life]: FKM, >= 0,7 mm, > 480 min

Body protection:
Safety shoes with steel toecap.
Body covering work clothing or chemical resistant suit at increased risk.

* **Respiratory protection**
Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.
Suitable respiratory protection apparatus:
Respiratory protection complying with EN 137.
Respiratory protection complying with EN 136.
Short term: filter apparatus, filter E

* **Environmental exposure controls**

* **Remark**
Prevent release to the environment.

* SECTION 9: Physical and chemical properties

* 9.1 Information on basic physical and chemical properties

Physical state
Gaseous / liquefied under pressure.

Colour
colourless

Odour
stinging

Safety relevant basis data

	Value	Method	Source, Remark
Odour threshold:			not determined
Melting point/freezing point			not applicable
Boiling point or initial boiling point and boiling range	19.5 °C pressure 1013 hPa		
flammability			none
Lower and upper explosion limit			not determined
Flash point			not applicable
Auto-ignition temperature			not determined
Decomposition temperature			not determined
pH			not applicable
Viscosity			not applicable
Solubility(ies)	Water solubility		completely miscible
Partition coefficient n-octanol/water (log value)			not applicable
Vapour pressure	1031 hPa (20°C)		
Density and/or relative density			not applicable
Relative vapour density	0.71		air = 1
particle characteristics			not applicable

* 9.2 Other information

* **Other information**
Developed white fog in humid air. Colorless.
Product effects hygroscopic.
Vapours are less heavy than air.

* SECTION 10: Stability and reactivity

10.1 Reactivity

See section "Possibility of hazardous reactions".

* 10.2 Chemical stability

The substance is chemically stable under recommended conditions of storage, use and temperature.

* 10.3 Possibility of hazardous reactions

Reactions with numerous chemical compounds.
Reactions with acids.
Reactions with organic substances.
Reactions with metals, with evolution of hydrogen.
Reactions with alkalies.

10.4 Conditions to avoid

Heat sources / heat - risk of bursting.
Humidity.

* 10.5 Incompatible materials

Copper, brass and other copper alloys
Aluminium / Aluminium alloys.
Glass
Organic substances (fats, oils).
Material, containing silicate

10.6 Hazardous decomposition products

Hydrogen

Additional information
Risk of hydrogen embrittlement.

* SECTION 11: Toxicological information

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

*** Acute toxicity**

*** Animal data**

	Effective dose	Method,Evaluation	Source, Remark
Acute oral toxicity			Study scientifically not necessary.
Acute dermal toxicity			Study scientifically not necessary.
Acute inhalation toxicity	CAS No.7664-39-3 hydrogen fluoride Acute inhalation toxicity (gas) LC50: 2240 ppm Species Rat Exposure time 1 h	OECD 403	

*** Assessment/classification**
Fatal if inhaled.
Fatal in contact with skin.
Fatal if swallowed.

*** Skin corrosion/irritation**

Animal data

Result / Evaluation	Method	Source, Remark
Corrosive. Species Rabbit	OECD 404	Aqueous solution.

* **Assessment/classification**
Causes severe burns.

* **Serious eye damage/irritation**

Animal data

Result / Evaluation	Method	Source, Remark
Corrosive Species Rabbit	OECD 405	Aqueous solution.

* **Assessment/classification**
Causes serious eye damage.

* **Sensitisation to the respiratory tract**

* **Other information**
Study scientifically not necessary.

* **Skin sensitisation**

* **Other information**
Study scientifically not necessary.

* **Germ cell mutagenicity**

	Value	Method	Result / Evaluation	Remark
In vitro mutagenicity/genotoxicity		OECD 471	negative	
In vivo mutagenicity/genotoxicity	Structural or numeric chromosome aberration		negative	fluoride

* **Assessment/classification**
Based on available data, the classification criteria are not met.

* **Carcinogenicity**

Animal data

	Value	Method	Result / Evaluation	Remark
Carcinogenicity	oral NOAEL(C): 25 ppm Species Rat Exposure duration 2 a			fluoride

* **Assessment/classification**
Based on available data, the classification criteria are not met.

* **Reproductive toxicity**

Animal data

	Value	Method	Result / Evaluation	Remark
Reproductive toxicity	oral NOAEL(C): 250 ppm Species Rat	OECD 416	Fluoride	Analogous to a similar product.

* **Assessment/classification**
Based on available data, the classification criteria are not met.

* **STOT-single exposure**

* **STOT SE 1 and 2**

* **Assessment/classification**
Based on available data, the classification criteria are not met.

* **STOT-repeated exposure**

* **Animal data**

	Effective dose	Method	Specific effects:	Organs affected:	Source, Remark
Inhalative specific target organ toxicity (repeated exposure)	NOAEL(C): 1 ppm Species Rat	OECD 413			

* **Assessment/classification**
Based on available data, the classification criteria are not met.

* **Aspiration hazard**

* **Assessment/classification**
Study technically not feasible.

11.2 Information on other hazards

No data available

* SECTION 12: Ecological information

* **12.1 Toxicity**

* **Aquatic toxicity**

	Effective dose	Method,Evaluation	Source, Remark
Acute (short-term) fish toxicity	LC50: 51 mg/L Species Oncorhynchus mykiss (Rainbow trout) Test duration 96 h		fluoride
Chronic (long-term) fish toxicity	not determined		
Acute (short-term) toxicity to crustacea	EC50 26 mg/L Species Benthic larvae Test duration 96 h		Fluoride.
Chronic (long-term) toxicity to aquatic invertebrate	not determined		
Acute (short-term) toxicity to algae and cyanobacteria	EC50 43 mg/L Species Scenedesmus sp. Test duration 96 h		Fluoride.
Chronic (long-term) toxicity to aquatic algae and cyanobacteria	not determined		
Toxicity to other aquatic plants/organisms	not determined		
Toxicity to microorganisms	EC10 510 mg/L Species activated sludge Test duration 3 h	OECD 209	Fluoride.

* **12.2 Persistence and degradability**

* **Assessment/classification**
Study scientifically not necessary.

* **12.3 Bioaccumulative potential**

	Value	Method	Source, Remark
Bioconcentration factor (BCF)	Bioconcentration factor (BCF) 149		CAS No.7664-39-3 hydrogen fluoride

* 12.4 Mobility in soil

	Value	Distribution	Transport type	Method	Remark
Half-life time in soil	1.959			KOC value	calculated

* 12.5 Results of PBT and vPvB assessment

The substance/mixture does not contain components meeting the PBT/vPvB criteria of the Reach Regulation, Annex XIII, at levels of 0.1% or higher.

* 12.6 Endocrine disrupting properties

	Effective dose	Method,Evaluation	Source, Remark
Endocrine disrupting properties			See section 2.3

12.7 Other adverse effects

No data available

* SECTION 13: Disposal considerations

* 13.1 Waste treatment methods

Waste codes/waste designations according to EWC/AVV

Waste code product	Waste name
160504 *	gases in pressure containers (including halons) containing hazardous substances

* **Appropriate disposal / Product**
Waste disposal according to directive 2008/98/EC, covering waste and dangerous waste.
Prevent release to the environment. No disposal via the sewage.

Appropriate disposal / Package
Transportable pressure equipment (empty, residual pressure): Return to supplier / manufacturer.

* SECTION 14: Transport information

	Land transport (ADR/RID)	Sea transport (IMDG)	Air transport (ICAO-TI / IATA-DGR)
14.1 UN number or ID number	UN 1052	UN 1052	UN 1052
14.2 UN proper shipping name	HYDROGEN FLUORIDE, ANHYDROUS	HYDROGEN FLUORIDE, ANHYDROUS	Hydrogen fluoride, anhydrous
14.3 Transport hazard class(es)	8 (6.1)	8 (6.1)	8 (6.1)
14.4 Packing group	I	I	-
14.5 Environmental hazards	No	No	No

14.6 Special precautions for user

The protective measures listed in Sections 6, 7 and 8 of the Safety Data Sheet have to be considered.

14.7 Maritime transport in bulk according to IMO instruments

No carriage in bulk.

Land transport (ADR/RID)

UN number or ID number	UN 1052
UN proper shipping name	HYDROGEN FLUORIDE, ANHYDROUS
Transport hazard class(es)	8 (6.1)
Hazard label(s)	8+6.1
Classification code	CT1
Packing group	I
Environmental hazards	No
Limited quantity (LQ)	0

Special provisions	-
Tunnel restriction code	C/D

*** Sea transport (IMDG)**

UN number or ID number	UN 1052
UN proper shipping name	HYDROGEN FLUORIDE, ANHYDROUS
Transport hazard class(es)	8 (6.1)
Packing group	I
Environmental hazards	No
Limited quantity (LQ)	0
Marine pollutant	No
EmS	F-C, S-U

*** Air transport (ICAO-TI / IATA-DGR)**

UN number or ID number	UN 1052
UN proper shipping name	Hydrogen fluoride, anhydrous
Transport hazard class(es)	8 (6.1)
Packing group	-
Environmental hazards	No

* SECTION 15: Regulatory information

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

*** EU legislation**

*** Restrictions of occupation**
Observe employment restrictions under the Maternity Protection Directive (92/85/EEC) for expectant or nursing mothers.
Observe restrictions to employment for juvenils according to the 'juvenile work protection guideline' (94/33/EC).

*** Other regulations (EU)**

*** To follow:**
Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.
REGULATION (EU) 2021/821 setting up a Union regime for the control of exports, brokering, technical assistance, transit and transfer of dual-use items.
National and local regulations concerning chemicals shall be observed.

15.2 Chemical Safety Assessment

*** National regulations**

For this substance a chemical safety assessment has been carried out.

* SECTION 16: Other information

Key literature references and sources for data
Information from our suppliers and data from the "GESTIS Substances Database" and the "Registered Substances" database of the European Chemicals Agency (ECHA) were used to create this safety data sheet.

*** Additional information**
The information contained herein is based on the state of our knowledge. It characterizes the product with regard to the appropriate safety precautions. It does not represent a guarantee of the properties of the product.

Relevant H- and EUH-phrases (Number and full text)

H300	Fatal if swallowed.
H310	Fatal in contact with skin.
H314	Causes severe skin burns and eye damage.

H330 Fatal if inhaled.

Indication of changes
* Data changed compared with the previous version

Annex

Scenario List

1. ES1 : Industrial use, Use as an intermediate

1.1. Scenario description

Main User Groups	:	**SU 3**	Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	:	**SU8**	Manufacture of bulk, large scale chemicals (including petroleum products)
		SU9	Manufacture of fine chemicals
Environmental release category	:	**ERC6a**	Industrial use resulting in manufacture of another substance (use of intermediates)
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)
		PROC4	Use in batch and other process (synthesis) where opportunity for exposure arises
		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)
Product category	:	**PC19**	Intermediate

1.2. Conditions of use affecting exposure

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

Product characteristics

Concentration of the Substance in Mixture/Article	:	Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Amount

Local daily emission to waste water	:	14,6 kg

Environmental factors

Flow rate	:	20.000 m3/d
Dilution Factor (River)	:	10

Other given operational conditions affecting environmental exposure

Number of emission days per year	:	300
Emission or Release Factor: Air	:	0,05 %

Technical conditions and measures / Organizational measures

Air	:	Used in closed system gas scrubber(Effectiveness (of a measure): 99 %)
Water	:	Chemical Precipitation

Conditions and measures related to sewage treatment plant

Type of Sewage Treatment Plant	:	none
Flow rate of sewage treatment plant effluent	:	2.000 m3/d

1.2.2 Contributing scenario controlling worker exposure for: 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, 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) Anhydrous form

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	gaseous, Anhydrous form

Frequency and duration of use

Frequency of use	:	220 days/year
Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Breathing volume	:	10 m3

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Use in closed process

Technical conditions and measures

with local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield, respiratory protection equipment
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

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

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	gaseous, Anhydrous form

Frequency and duration of use

Frequency of use	:	220 days/year
Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Breathing volume : 10 m3

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Use in closed process

Technical conditions and measures
without local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

1.2.4 Contributing scenario controlling worker exposure for: 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, 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) 40-85%, aqueous solution

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 85%
Physical Form (at time of use) : 40-85%, aqueous solution

Frequency and duration of use
Frequency of use : 220 days/year
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Breathing volume : 10 m3

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Use in closed process

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

1.2.5 Contributing scenario controlling worker exposure for: 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, 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) <40% Aqueous solution

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 85%
Physical Form (at time of use) : <40%, Aqueous solution

Frequency and duration of use
Frequency of use : 220 days/year
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Breathing volume : 10 m3

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
Remarks : Use in closed process

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

Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

1.3. Exposure estimation and reference to its source

Environment

Release factor	Value type	Compartment	Environmental exposure	RCR
ERC6a	Local PEC	Fresh water	0,73 mg/L	0,811
		Fresh water sediment	0,622 mg/kg (dw)	0,812
		Marine water	0,073 mg/L	0,0811
		Marine sediment	0,0622 mg/kg (dw)	0,0812
		Agricultural soil	0,0017 mg/kg (ww)	0,00015
		Grass land	0,0017 mg/kg (ww)	0,00015
		STP	7,3 mg/L	0,143

Human Health

Contributing Scenario	Specific conditions	Value type	Level of Exposure	RCR
PROC2	Anhydrous form	Worker - inhalative, long-term - systemic	0,208 mg/m³	0,139
PROC3, PROC4	Anhydrous form	Worker - inhalative, long-term - systemic	0,417 mg/m³	0,278
PROC8b	Anhydrous form	Worker - inhalative, long-term - systemic	0,188 mg/m³	0,125
PROC9	Anhydrous form	Worker - inhalative, long-term - systemic	0,833 mg/m³	0,555
PROC8b	Anhydrous form	Worker - inhalative, short-term - local	0,184 mg/m³	0,0736
PROC9	Anhydrous form	Worker - inhalative, short-term - local	0,818 mg/m³	0,327
PROC1	Anhydrous form	Worker - inhalative, long-term - systemic	0,008 mg/m³	0,005
PROC1, PROC2	40-85%, aqueous solution	Worker - inhalative, long-term - systemic	0,001 mg/m³	0,0007
PROC3, PROC8b, PROC9	40-85%, aqueous solution	Worker - inhalative, long-term - systemic	0,01 mg/m³	0,007
PROC4	40-85%, aqueous solution	Worker - inhalative, long-term - systemic	0,05 mg/m³	0,033
PROC8b, PROC9	40-85%, aqueous solution	Worker - inhalative, short-term - local	0,02 mg/m³	0,008
PROC1, PROC2	<40%, Aqueous solution	Worker - inhalative, long-term - systemic	0,001 mg/m³	0,0007
PROC3, PROC8b, PROC9	<40%, Aqueous solution	Worker - inhalative, long-term - systemic	0,01 mg/m³	0,007
PROC4	<40%, Aqueous solution	Worker - inhalative, long-term - systemic	0,05 mg/m³	0,033
PROC8b, PROC9	<40%, Aqueous solution	Worker - inhalative, short-term - local	0,02 mg/m³	0,008

RCR = Risk characterisation ratio

ERC6a	Exposure Assessment Method : EUSES v2.1
PROC2	Exposure Assessment Method : MEASE
PROC3, PROC4	Exposure Assessment Method : MEASE
PROC8b	Exposure Assessment Method : MEASE
PROC9	Exposure Assessment Method : MEASE
PROC8b	Exposure Assessment Method : MEASE

PROC9	Exposure Assessment Method : MEASE
PROC1	Exposure Assessment Method : MEASE
PROC1, PROC2	Exposure Assessment Method : MEASE
PROC3, PROC8b, PROC9	Exposure Assessment Method : MEASE
PROC4	Exposure Assessment Method : MEASE
PROC8b, PROC9	Exposure Assessment Method : MEASE
PROC1, PROC2	Exposure Assessment Method : MEASE
PROC3, PROC8b, PROC9	Exposure Assessment Method : MEASE
PROC4	Exposure Assessment Method : MEASE
PROC8b, PROC9	Exposure Assessment Method : MEASE

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

1.4.1 Environment

If a DU has OC/RMMs outside specifications in the ES, then the DU can evaluate whether he works inside the boundaries set by the ES through scaling in EUSES.
The main driving parameters are :
- local amount used (tonnage)
- release factor prior to on-site treatment
- on-site wastewater treatment presence and efficiency
- dilution factor

Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1.4.2 Health

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented., Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

2. ES2 : Industrial use, Catalyst

2.1. Scenario description

Main User Groups	:	**SU 3**	Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	:	**SU8**	Manufacture of bulk, large scale chemicals (including petroleum products)
		SU9	Manufacture of fine chemicals
Environmental release category	:	**ERC6b**	Industrial use of reactive processing aids
Process category	:	**PROC1**	Use in closed process, no likelihood of exposure
		PROC2	Use in closed, continuous process with occasional controlled exposure
		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)
Product category	:	**PC20**	Products such as pH-regulators, flocculants, precipitants, neutralization agents

2.2. Conditions of use affecting exposure

2.2.1 Contributing scenario controlling environmental exposure for: ERC6b Industrial use of reactive processing aids

Product characteristics

Concentration of the Substance in Mixture/Article	:	Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Amount

Local daily emission to waste water	:	14,6 kg

Environmental factors

Flow rate	:	20.000 m3/d
Dilution Factor (River)	:	10

Other given operational conditions affecting environmental exposure

Number of emission days per year	:	20
Emission or Release Factor: Air	:	0,001 %

Technical conditions and measures / Organizational measures

Air	:	Used in closed system gas scrubber(Effectiveness (of a measure): 99 %)
Water	:	Chemical Precipitation

Conditions and measures related to sewage treatment plant

Type of Sewage Treatment Plant	:	none
Flow rate of sewage treatment plant effluent	:	2.000 m3/d

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

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	gaseous, Anhydrous form

Frequency and duration of use

Frequency of use	:	220 days/year

Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Breathing volume : 10 m3

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Use in closed process

Technical conditions and measures
without local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield, respiratory protection equipment
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

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

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use) : gaseous, Anhydrous form

Frequency and duration of use
Frequency of use : 220 days/year
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Breathing volume : 10 m3

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Use in closed process

Technical conditions and measures
with local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield, respiratory protection equipment
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

2.3. Exposure estimation and reference to its source

Environment

Release factor	Value type	Compartment	Environmental exposure	RCR
ERC6b	Local PEC	Fresh water	0,73 mg/L	0,81
		Fresh water sediment	0,622 mg/kg (dw)	0,812
		Marine water	0,073 mg/L	0,081
		Marine sediment	0,0622 mg/kg (dw)	0,0812
		Agricultural soil	< 0,0000001 mg/kg (ww)	< 0,000001
		Grass land	< 0,0000001 mg/kg (ww)	< 0,000001
		STP	7,3 mg/L	0,143

Human Health

Contributing Scenario	Specific conditions	Value type	Level of Exposure	RCR
PROC1		Worker - inhalative, long-term - systemic	0,008 mg/m³	0,0056
PROC2		Worker - inhalative, long-term - systemic	0,102 mg/m³	0,068
PROC8b		Worker - inhalative, long-term - systemic	0,092 mg/m³	0,061
PROC9		Worker - inhalative, long-term - systemic	0,409 mg/m³	0,273
PROC8b		Worker - inhalative, long-term - systemic	0,184 mg/m³	0,074
PROC9		Worker - inhalative, long-term - systemic	0,818 mg/m³	0,327

RCR = Risk characterisation ratio

ERC6b	Exposure Assessment Method : EUSES v2.1
PROC1	Exposure Assessment Method : MEASE
PROC2	Exposure Assessment Method : MEASE
PROC8b	Exposure Assessment Method : MEASE
PROC9	Exposure Assessment Method : MEASE
PROC8b	Exposure Assessment Method : MEASE
PROC9	Exposure Assessment Method : MEASE

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

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented., Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

3. ES3 : Industrial use, Industrial laboratory use

3.1. Scenario description

Main User Groups	:	**SU 3**	Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	:	**SU22**	Public domain (administration, education, entertainment, services, craftsmen)
Environmental release category	:	**ERC8a**	Wide dispersive indoor use of processing aids in open systems
		ERC8b	Wide dispersive indoor use of reactive substances in open systems
Process category	:	**PROC15**	Use as laboratory reagent
Product category	:	**PC21**	Laboratory chemicals

3.2. Conditions of use affecting exposure

3.2.1 Contributing scenario controlling environmental exposure for: ERC8a Wide dispersive indoor use of processing aids in open systems, ERC8b Wide dispersive indoor use of reactive substances in open systems

Product characteristics

Concentration of the Substance in Mixture/Article	:	Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Amount

Maximal annual amount used	:	1 t
Daily amount per site	:	3,33 kg
Local daily emission to waste water	:	14,6 kg

Environmental factors

Flow rate	:	20.000 m3/d
Dilution Factor (River)	:	10

Other given operational conditions affecting environmental exposure

Number of emission days per year	:	300

Technical conditions and measures / Organizational measures

Air	:	Used in closed system gas scrubber
Water	:	Chemical Precipitation

Conditions and measures related to sewage treatment plant

Type of Sewage Treatment Plant	:	Onsite STP
Flow rate of sewage treatment plant effluent	:	2.000 m3/d

3.2.2 Contributing scenario controlling worker exposure for: PROC15 Use as laboratory reagent Anhydrous form

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	gaseous, Anhydrous form

Frequency and duration of use

Frequency of use	:	220 days/year
Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Breathing volume	:	10 m3

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Use in closed process

Technical conditions and measures

with local exhaust ventilation, Work in a fume hood.

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield, respiratory protection equipment
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

3.2.3 Contributing scenario controlling worker exposure for: PROC15 Use as laboratory reagent 40-85%, aqueous solution

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	40-85%, aqueous solution

Frequency and duration of use

Frequency of use	:	220 days/year
Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Breathing volume	:	10 m3

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Use in closed process

Technical conditions and measures

with local exhaust ventilation, Work in a fume hood.

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

3.3. Exposure estimation and reference to its source

Environment

Release factor	Value type	Compartment	Environmental exposure	RCR
ERC8a, ERC8b	Local PEC	Fresh water	0,73 mg/L	0,811
		Fresh water sediment	0,622 mg/kg (dw)	0,812
		Marine water	0,073 mg/L	0,0811
		Marine sediment	0,0622 mg/kg (dw)	0,0812
		Agricultural soil	< 0,0000001 mg/kg (ww)	< 0,000001
		Grass land	< 0,0000001 mg/kg (ww)	< 0,000001
		STP	7,3 mg/L	0,143

Human Health

Contributing Scenario	Specific conditions	Value type	Level of Exposure	RCR
PROC15	Anhydrous form	Worker - inhalative, long-term - systemic	0,102 mg/m³	0,068
PROC15	Anhydrous form	Worker - inhalative, long-term - systemic	0,204 mg/m³	0,08
PROC15	40-85%, aqueous solution	Worker - inhalative, long-term - local	0,01 mg/m³	0,007
PROC15	40-85%, aqueous solution	Worker - inhalative, long-term - systemic	0,02 mg/m³	0,008

RCR = Risk characterisation ratio

ERC8a, ERC8b Exposure Assessment Method : EUSES v2.1
PROC15 Exposure Assessment Method : MEASE
PROC15 Exposure Assessment Method : MEASE
PROC15 Exposure Assessment Method : MEASE
PROC15 Exposure Assessment Method : MEASE

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

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented., Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented., Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

4. ES4 : Industrial use, Use in mining industry, Purification

4.1. Scenario description

Main User Groups	:	**SU 3**	Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	:	**SU14**	Manufacture of basic metals, including alloys
		SU15	Manufacture of fabricated metal products, except machinery and equipment
		SU2a	Mining, (without offshore industries)
Environmental release category	:	**ERC4**	Industrial use of processing aids in processes and products, not becoming part of articles
		ERC6b	Industrial use of reactive processing aids
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)
		PROC4	Use in batch and other process (synthesis) where opportunity for exposure arises
		PROC7	Industrial spraying
		PROC13	Treatment of articles by dipping and pouring
		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)
		PROC19	Hand-mixing with intimate contact and only PPE available
Product category	:	**PC14**	Metal surface treatment products, including galvanic and electroplating products
		PC15	Non-metal-surface treatment products
		PC35	Washing and cleaning products (including solvent based products)
		PC40	Extraction agents

4.2. Conditions of use affecting exposure

4.2.1 Contributing scenario controlling environmental exposure for: ERC4 Industrial use of processing aids in processes and products, not becoming part of articles, ERC6b Industrial use of reactive processing aids

Product characteristics

Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 85%

Amount

Local daily emission to waste water : 14,6 kg

Environmental factors

Flow rate : 20.000 m3/d
Dilution Factor (River) : 10

Other given operational conditions affecting environmental exposure

Number of emission days per year : 100
Emission or Release Factor: Air : 0,001 %

Technical conditions and measures / Organizational measures

Air : Used in closed system
gas scrubber(Effectiveness (of a measure): 99 %)
Water : Chemical Precipitation

Conditions and measures related to sewage treatment plant

Type of Sewage Treatment Plant : Onsite STP

Flow rate of sewage treatment plant effluent : 2.000 m3/d

4.2.2 Contributing scenario controlling worker exposure for: PROC1 Use in closed process, no likelihood of exposure 40-85%, aqueous solution

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 85%
Physical Form (at time of use) : 40-85%, aqueous solution

Frequency and duration of use
Frequency of use : 220 days/year
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Breathing volume : 10 m3

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Use in closed process

Technical conditions and measures
without local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

4.2.3 Contributing scenario controlling worker exposure for: PROC1 Use in closed process, no likelihood of exposure <40% Aqueous solution

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 40%
Physical Form (at time of use) : <40%, Aqueous solution

Frequency and duration of use
Frequency of use : 220 days/year
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Breathing volume : 10 m3

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Use in closed process

Technical conditions and measures
without local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield

Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

4.2.4 Contributing scenario controlling worker exposure for: PROC2 Use in closed, continuous process with occasional controlled exposure, PROC3 Use in closed batch process (synthesis or formulation), PROC4 Use in batch and other process (synthesis) where opportunity for exposure arises, PROC7 Industrial spraying, 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), PROC13 Treatment of articles by dipping and pouring, PROC19 Hand-mixing with intimate contact and only PPE available 40-85%, aqueous solution

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 85%
Physical Form (at time of use)	:	40-85%, aqueous solution

Frequency and duration of use

Frequency of use	:	220 days/year
Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Breathing volume	:	10 m3

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Use in closed process

Technical conditions and measures
with local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield, respiratory protection equipment
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

4.2.5 Contributing scenario controlling worker exposure for: PROC2 Use in closed, continuous process with occasional controlled exposure, PROC3 Use in closed batch process (synthesis or formulation), PROC4 Use in batch and other process (synthesis) where opportunity for exposure arises, PROC7 Industrial spraying, 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), PROC13 Treatment of articles by dipping and pouring, PROC19 Hand-mixing with intimate contact and only PPE available <40% Aqueous solution

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 40%
Physical Form (at time of use)	:	<40%, Aqueous solution

Frequency and duration of use

Frequency of use	:	220 days/year
Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Breathing volume	:	10 m3

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Use in closed process

Technical conditions and measures
with local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable working clothes., Safety shoes

Wear suitable gloves tested to EN374., Face-shield, respiratory protection equipment

Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

4.3. Exposure estimation and reference to its source

Environment

Release factor	Value type	Compartment	Environmental exposure	RCR
ERC4, ERC6b	Local PEC	Fresh water	0,73 mg/L	0,811
		Fresh water sediment	0,622 mg/kg (dw)	0,812
		Marine water	0,073 mg/L	0,0811
		Marine sediment	0,0622 mg/kg (dw)	0,0812
		Agricultural soil	0,000003 mg/kg (ww)	< 0,000001
		Grass land	0,000003 mg/kg (ww)	< 0,000001
		STP	7,3 mg/L	0,143

Human Health

Contributing Scenario	Specific conditions	Value type	Level of Exposure	RCR
PROC1	40-85%, aqueous solution	Worker - inhalative, long-term - systemic	0,008 mg/m³	0,0056
PROC1	<40%, Aqueous solution	Worker - inhalative, long-term - systemic	0,008 mg/m³	0,0056
PROC2	40-85%, aqueous solution	Worker - inhalative, long-term - systemic	0,001 mg/m³	0,0007
PROC3, PROC8b, PROC9, PROC13	40-85%, aqueous solution	Worker - inhalative, long-term - systemic	0,01 mg/m³	0,007
PROC4, PROC19	40-85%, aqueous solution	Worker - inhalative, long-term - systemic	0,05 mg/m³	0,033
PROC7	40-85%, aqueous solution	Worker - inhalative, long-term - systemic	0,025 mg/m³	0,017
PROC7	40-85%, aqueous solution	Worker - inhalative, short-term - local	0,05 mg/m³	0,02
PROC8b, PROC9, PROC13	40-85%, aqueous solution	Worker - inhalative, short-term - local	0,02 mg/m³	0,008
PROC19	40-85%, aqueous solution	Worker - inhalative, short-term - local	0,1 mg/m³	0,04
PROC3, PROC8b, PROC9, PROC13	<40%, Aqueous solution	Worker - inhalative, long-term - systemic	0,01 mg/m³	0,007
PROC4, PROC19	<40%, Aqueous solution	Worker - inhalative, long-term - systemic	0,05 mg/m³	0,033
PROC7	<40%, Aqueous solution	Worker - inhalative, long-term - systemic	0,025 mg/m³	0,017
PROC7	<40%, Aqueous solution	Worker - inhalative, short-term - local	0,05 mg/m³	0,02
PROC8b, PROC9, PROC13	<40%, Aqueous solution	Worker - inhalative, short-term - local	0,02 mg/m³	0,008
PROC19	<40%, Aqueous solution	Worker - inhalative, short-term - local	0,1 mg/m³	0,04

RCR = Risk characterisation ratio

ERC4, ERC6b	Exposure Assessment Method : EUSES v2.1
PROC1	Exposure Assessment Method : MEASE
PROC1	Exposure Assessment Method : MEASE
PROC2	Exposure Assessment Method : MEASE
PROC3, PROC8b, PROC9, PROC13	Exposure Assessment Method : MEASE
PROC4, PROC19	Exposure Assessment Method : MEASE
PROC7	Exposure Assessment Method : MEASE
PROC7	Exposure Assessment Method : MEASE
PROC8b, PROC9, PROC13	Exposure Assessment Method : MEASE
PROC19	Exposure Assessment Method : MEASE
PROC3, PROC8b, PROC9, PROC13	Exposure Assessment Method : MEASE
PROC4, PROC19	Exposure Assessment Method : MEASE
PROC7	Exposure Assessment Method : MEASE
PROC7	Exposure Assessment Method : MEASE
PROC8b, PROC9, PROC13	Exposure Assessment Method : MEASE
PROC19	Exposure Assessment Method : MEASE

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

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented., Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

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Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented., Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

5. ES5 : Industrial use, Passivation of metal surface

5.1. Scenario description

Main User Groups	:	**SU 3**	Industrial uses: Uses of substances as such or in preparations at industrial sites
Environmental release category	:	**ERC5**	Industrial use resulting in inclusion into or onto a matrix
Process category	:	**PROC1**	Use in closed process, no likelihood of exposure
		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)
Product category	:	**PC14**	Metal surface treatment products, including galvanic and electroplating products

5.2. Conditions of use affecting exposure

5.2.1 Contributing scenario controlling environmental exposure for: ERC5 Industrial use resulting in inclusion into or onto a matrix

Product characteristics

Concentration of the Substance in Mixture/Article	:	Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Amount

Local daily emission to waste water	:	14,6 kg

Environmental factors

Flow rate	:	20.000 m3/d
Dilution Factor (River)	:	10

Other given operational conditions affecting environmental exposure

Number of emission days per year	:	20
Emission or Release Factor: Air	:	0,05 %

Technical conditions and measures / Organizational measures

Air	:	Used in closed system gas scrubber(Effectiveness (of a measure): 99 %)
Water	:	Chemical Precipitation

Conditions and measures related to sewage treatment plant

Type of Sewage Treatment Plant	:	Onsite STP
Flow rate of sewage treatment plant effluent	:	2.000 m3/d

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

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	gaseous, Anhydrous form

Frequency and duration of use

Frequency of use	:	220 days/year
Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Breathing volume	:	10 m3

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Use in closed process

Technical conditions and measures

without local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

5.2.3 Contributing scenario controlling worker exposure for: 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)

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	gaseous, Anhydrous form

Frequency and duration of use

Frequency of use	:	220 days/year
Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Breathing volume	:	10 m3

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Use in closed process

Technical conditions and measures

with local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield, respiratory protection equipment
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

5.3. Exposure estimation and reference to its source

Environment

Release factor	Value type	Compartment	Environmental exposure	RCR
ERC5	Local PEC	Fresh water	0,73 mg/L	0,811
		Fresh water sediment	0,641 mg/kg (dw)	0,812
		Marine water	0,073 mg/L	0,0811
		Marine sediment	0,0641 mg/kg (dw)	0,0812
		Agricultural soil	0,00045 mg/kg (ww)	0,00004
		Grass land	0,00045 mg/kg (ww)	0,00004
		STP	7,3 mg/L	0,143

Human Health

Contributing Scenario	Specific conditions	Value type	Level of Exposure	RCR
PROC1		Worker - inhalative, long-term - systemic	0,008 mg/m³	0,005
PROC8b		Worker - inhalative, long-term - systemic	0,092 mg/m³	0,061
PROC9		Worker - inhalative, long-term - systemic	0,409 mg/m³	0,273
PROC8b		Worker - inhalative, short-term - local	0,0184 mg/m³	0,007
PROC9		Worker - inhalative, short-term - local	0,818 mg/m³	0,327

RCR = Risk characterisation ratio

ERC5 Exposure Assessment Method : EUSES v2.1
PROC1 Exposure Assessment Method : MEASE
PROC8b Exposure Assessment Method : MEASE
PROC9 Exposure Assessment Method : MEASE
PROC8b Exposure Assessment Method : MEASE
PROC9 Exposure Assessment Method : MEASE

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

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented., Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented., Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

6. ES6 : Industrial use, Use of construction chemicals

6.1. Scenario description

Main User Groups	:	**SU 3**	Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	:	**SU 10**	Formulation [mixing] of preparations and/ or re-packaging (excluding alloys)
		SU19	Building and construction work
Environmental release category	:	**ERC2**	Formulation of preparations
Process category	:	**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
		PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

6.2. Conditions of use affecting exposure

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

Product characteristics

Concentration of the Substance in Mixture/Article	:	Covers the percentage of the substance in the product up to 40%

Amount

Local daily emission to waste water	:	14,6 kg

Environmental factors

Flow rate	:	20.000 m3/d
Dilution Factor (River)	:	10

Other given operational conditions affecting environmental exposure

Number of emission days per year	:	20
Emission or Release Factor: Air	:	0,0025 %

Technical conditions and measures / Organizational measures

Air	:	Used in closed system gas scrubber(Effectiveness (of a measure): 99 %)
Water	:	Chemical Precipitation

Conditions and measures related to sewage treatment plant

Type of Sewage Treatment Plant	:	Onsite STP
Flow rate of sewage treatment plant effluent	:	2.000 m3/d

6.2.2 Contributing scenario controlling worker exposure for: 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, PROC9 Transfer of substance or preparation into small containers (dedicated filling line, including weighing) <40% Aqueous solution

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	<40%, Aqueous solution

Frequency and duration of use
Frequency of use : 220 days/year
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Breathing volume : 10 m3

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Use in closed process

Technical conditions and measures
with local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield, respiratory protection equipment
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

6.3. Exposure estimation and reference to its source

Environment

Release factor	Value type	Compartment	Environmental exposure	RCR
ERC2	Local PEC	Fresh water	0,73 mg/L	0,811
		Fresh water sediment	0,622 mg/kg (dw)	0,812
		Marine water	0,073 mg/L	0,0811
		Marine sediment	0,0622 mg/kg (dw)	0,0812
		Agricultural soil	0,000009 mg/kg (ww)	< 0,000001
		Grass land	0,000009 mg/kg (ww)	< 0,000001
		STP	7,3 mg/L	0,143

Human Health

Contributing Scenario	Specific conditions	Value type	Level of Exposure	RCR
PROC3, PROC8b, PROC9		Worker - inhalative, long-term - systemic	0,01 mg/m³	0,007
PROC8a		Worker - inhalative, long-term - systemic	0,05 mg/m³	0,033
PROC8a		Worker - inhalative, short-term - local	0,1 mg/m³	0,04
PROC8b, PROC9		Worker - inhalative, short-term - local	0,02 mg/m³	0,008

RCR = Risk characterisation ratio

ERC2	Exposure Assessment Method : EUSES v2.1
PROC3, PROC8b, PROC9	Exposure Assessment Method : MEASE
PROC8a	Exposure Assessment Method : MEASE
PROC8a	Exposure Assessment Method : MEASE
PROC8b, PROC9	Exposure Assessment Method : MEASE

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

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented., Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

7. ES7 : Industrial use, Formulation

7.1. Scenario description

Main User Groups	:	**SU 3**	Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	:	**SU 10**	Formulation [mixing] of preparations and/ or re-packaging (excluding alloys)
Environmental release category	:	**ERC2**	Formulation of preparations
Process category	:	**PROC3**	Use in closed batch process (synthesis or formulation)
		PROC5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)
		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)
		PROC13	Treatment of articles by dipping and pouring
		PROC19	Hand-mixing with intimate contact and only PPE available

7.2. Conditions of use affecting exposure

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

Product characteristics

Concentration of the Substance in Mixture/Article	:	Covers the percentage of the substance in the product up to 85%

Amount

Local daily emission to waste water	:	14,6 kg

Environmental factors

Flow rate	:	20.000 m3/d
Dilution Factor (River)	:	10

Other given operational conditions affecting environmental exposure

Number of emission days per year	:	100
Emission or Release Factor: Air	:	0,025 %

Technical conditions and measures / Organizational measures

Air	:	Used in closed system gas scrubber(Effectiveness (of a measure): 99 %)
Water	:	Chemical Precipitation

Conditions and measures related to sewage treatment plant

Type of Sewage Treatment Plant	:	Onsite STP
Flow rate of sewage treatment plant effluent	:	2.000 m3/d

7.2.2 Contributing scenario controlling worker exposure for: PROC3 Use in closed batch process (synthesis or formulation), PROC5 Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), 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), PROC13 Treatment of articles by dipping and pouring, PROC19 Hand-mixing with intimate contact and only PPE available Anhydrous form

Product characteristics

Concentration of the Substance in Mixture/Article	Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use) : gaseous, Anhydrous form

Frequency and duration of use
Frequency of use : 220 days/year
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Breathing volume : 10 m3

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Use in closed process

Technical conditions and measures
with local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield, respiratory protection equipment
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

7.2.3 Contributing scenario controlling worker exposure for: PROC3 Use in closed batch process (synthesis or formulation), PROC5 Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), 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), PROC13 Treatment of articles by dipping and pouring, PROC19 Hand-mixing with intimate contact and only PPE available 40-85%, aqueous solution

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 85%
Physical Form (at time of use) : 40-85%, aqueous solution

Frequency and duration of use
Frequency of use : 220 days/year
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management
Breathing volume : 10 m3

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Use in closed process

Technical conditions and measures
with local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield, respiratory protection equipment
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

7.3. Exposure estimation and reference to its source

Environment

Release factor	Value type	Compartment	Environmental exposure	RCR
ERC2	Local PEC	Fresh water	0,73 mg/L	0,811
		Fresh water sediment	0,622 mg/kg (dw)	0,812
		Marine water	0,073 mg/L	0,0811
		Marine sediment	0,0622 mg/kg (dw)	0,0812
		Agricultural soil	0,0001 mg/kg (ww)	0,00001
		Grass land	0,0001 mg/kg (ww)	0,00001
		STP	7,3 mg/L	0,143

Human Health

Contributing Scenario	Specific conditions	Value type	Level of Exposure	RCR
PROC3	Anhydrous form	Worker - inhalative, long-term - systemic	0,204 mg/m³	0,136
PROC5	Anhydrous form	Worker - inhalative, long-term - systemic	0,511 mg/m³	0,341
PROC8b	Anhydrous form	Worker - inhalative, long-term - systemic	0,092 mg/m³	0,061
PROC9	Anhydrous form	Worker - inhalative, long-term - systemic	0,409 mg/m³	0,273
PROC5	Anhydrous form	Worker - inhalative, short-term - local	1,02 mg/m³	0,408
PROC8b	Anhydrous form	Worker - inhalative, short-term - local	0,184 mg/m³	0,073
PROC9	Anhydrous form	Worker - inhalative, short-term - local	0,818 mg/m³	0,327
PROC3, PROC5	40-85%, aqueous solution	Worker - inhalative, long-term - systemic	0,05 mg/m³	0,033
PROC8b, PROC9, PROC13, PROC19	40-85%, aqueous solution	Worker - inhalative, long-term - systemic	0,01 mg/m³	0,007
PROC5	40-85%, aqueous solution	Worker - inhalative, short-term - local	0,1 mg/m³	0,04
PROC8b, PROC9, PROC13, PROC19	40-85%, aqueous solution	Worker - inhalative, short-term - local	0,02 mg/m³	0,008

RCR = Risk characterisation ratio

ERC2	Exposure Assessment Method : EUSES v2.1
PROC3	Exposure Assessment Method : MEASE
PROC5	Exposure Assessment Method : MEASE
PROC8b	Exposure Assessment Method : MEASE
PROC9	Exposure Assessment Method : MEASE
PROC5	Exposure Assessment Method : MEASE
PROC8b	Exposure Assessment Method : MEASE
PROC9	Exposure Assessment Method : MEASE
PROC3, PROC5	Exposure Assessment Method : MEASE
PROC8b, PROC9, PROC13, PROC19	Exposure Assessment Method : MEASE

PROC5	Exposure Assessment Method : MEASE
PROC8b, PROC9, PROC13, PROC19	Exposure Assessment Method : MEASE

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

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented., Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

8. ES8 : Industrial use, Surface cleaning

8.1. Scenario description

Main User Groups	:	**SU 3**	Industrial uses: Uses of substances as such or in preparations at industrial sites
Environmental release category	:	**ERC7**	Industrial use of substances in closed systems
Process category	:	**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
		PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
		PROC13	Treatment of articles by dipping and pouring
Product category	:	**PC35**	Washing and cleaning products (including solvent based products)

8.2. Conditions of use affecting exposure

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

Product characteristics

Concentration of the Substance in Mixture/Article	:	Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Amount

Local daily emission to waste water	:	0 kg
Concentration after dilution for use maximum	:	7,3 mg/L

Environmental factors

Flow rate	:	20.000 m3/d
Dilution Factor (River)	:	10

Other given operational conditions affecting environmental exposure

Number of emission days per year	:	100
Emission or Release Factor: Air	:	0,5 %

Technical conditions and measures / Organizational measures

Air	:	Used in closed system gas scrubber(Effectiveness (of a measure): 99 %)
Water	:	Chemical Precipitation

Conditions and measures related to sewage treatment plant

Type of Sewage Treatment Plant	:	none

8.2.2 Contributing scenario controlling worker exposure for: 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, PROC9 Transfer of substance or preparation into small containers (dedicated filling line, including weighing), PROC13 Treatment of articles by dipping and pouring <40% Aqueous solution

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	<40%, Aqueous solution

Frequency and duration of use

Frequency of use	:	220 days/year
Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Breathing volume : 10 m3

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
Remarks : Use in closed process

Technical conditions and measures

with local exhaust ventilation

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield, respiratory protection equipment
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

8.3. Exposure estimation and reference to its source

Environment

Release factor	Value type	Compartment	Environmental exposure	RCR
ERC7	Local PEC	Fresh water	0,73 mg/L	0,811
		Fresh water sediment	0,622 mg/kg (dw)	0,812
		Marine water	0,073 mg/L	0,0811
		Marine sediment	0,0622 mg/kg (dw)	0,0812
		Agricultural soil	0,000003 mg/kg (ww)	< 0,00001
		Grass land	0,000003 mg/kg (ww)	< 0,00001
		STP	7,3 mg/L	0,143

Human Health

Contributing Scenario	Specific conditions	Value type	Level of Exposure	RCR
PROC3, PROC8b, PROC9, PROC13		Worker - inhalative, long-term - systemic	0,01 mg/m³	0,007
PROC8b, PROC9, PROC13		Worker - inhalative, short-term - local	0,02 mg/m³	0,008

RCR = Risk characterisation ratio

ERC7	Exposure Assessment Method : EUSES v2.1
PROC3, PROC8b, PROC9, PROC13	Exposure Assessment Method : MEASE
PROC8b, PROC9, PROC13	Exposure Assessment Method : MEASE

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

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented.

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

9. ES9 : Industrial use, Used in electronics applications

9.1. Scenario description

Main User Groups	:	**SU 3**	Industrial uses: Uses of substances as such or in preparations at industrial sites
Environmental release category	:	**ERC6b**	Industrial use of reactive processing aids
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)
		PROC4	Use in batch and other process (synthesis) where opportunity for exposure arises
		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)
Product category	:	**PC15**	Non-metal-surface treatment products

9.2. Conditions of use affecting exposure

9.2.1 Contributing scenario controlling environmental exposure for: ERC6b Industrial use of reactive processing aids

Product characteristics

Concentration of the Substance in Mixture/Article	:	Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Amount

Local daily emission to waste water	:	0 kg
Concentration after dilution for use maximum	:	7,3 mg/L

Environmental factors

Flow rate	:	20.000 m3/d
Dilution Factor (River)	:	10

Other given operational conditions affecting environmental exposure

Number of emission days per year	:	100
Emission or Release Factor: Air	:	0,001 %

Technical conditions and measures / Organizational measures

Air	:	Used in closed system gas scrubber(Effectiveness (of a measure): 99 %)
Water	:	Chemical Precipitation

Conditions and measures related to sewage treatment plant

Type of Sewage Treatment Plant	:	none

9.2.2 Contributing scenario controlling worker exposure for: 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, 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) 40-85%, aqueous solution

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	40-85%, aqueous solution

Frequency and duration of use

Frequency of use	:	220 days/year
Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Breathing volume	:	10 m3

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Use in closed process

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable working clothes., Safety shoes
Wear suitable gloves tested to EN374., Face-shield, respiratory protection equipment
Smoking, eating and drinking should be prohibited in the application area., Wash thoroughly after handling.

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

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	gaseous, Anhydrous form

Frequency and duration of use

Frequency of use	:	220 days/year
Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Breathing volume	:	10 m3

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Remarks	:	Use in closed process

9.3. Exposure estimation and reference to its source

Environment

Release factor	Value type	Compartment	Environmental exposure	RCR
ERC6b	Local PEC	Fresh water	0,73 mg/L	0,811
		Fresh water sediment	0,641 mg/kg (dw)	0,812
		Marine water	0,073 mg/L	0,0811
		Marine sediment	0,0641 mg/kg (dw)	0,0812
		Agricultural soil	0,0000009 mg/kg (ww)	< 0,00001
		Grass land	0,0000009 mg/kg (ww)	< 0,00001
		STP	7,3 mg/L	0,143

Human Health

Contributing Scenario	Specific conditions	Value type	Level of Exposure	RCR
PROC2		Worker - inhalative, long-term - systemic	0,102 mg/m³	0,068
PROC3, PROC4		Worker - inhalative, long-term - systemic	0,204 mg/m³	0,136
PROC8b		Worker - inhalative, long-term - systemic	0,092 mg/m³	0,061
PROC9		Worker - inhalative, long-term - systemic	0,409 mg/m³	0,273
PROC8b		Worker - inhalative, short-term - local	0,818 mg/m³	0,327
PROC9		Worker - inhalative, short-term - local	0,02 mg/m³	0,008
PROC1		Worker - inhalative, long-term - systemic	0,008 mg/m³	0,005

RCR = Risk characterisation ratio

ERC6b	Exposure Assessment Method : EUSES v2.1
PROC2	Exposure Assessment Method : MEASE
PROC3, PROC4	Exposure Assessment Method : MEASE
PROC8b	Exposure Assessment Method : MEASE
PROC9	Exposure Assessment Method : MEASE
PROC8b	Exposure Assessment Method : MEASE
PROC9	Exposure Assessment Method : MEASE
PROC1	Exposure Assessment Method : MEASE

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

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.