

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

1.1. Product identifier

Product form	: Substance
Trade name	: Zinc Oxide Indirect
Chemical name	: zinc oxide
IUPAC name	: zinc oxide
EC Index-No.	: 030-013-00-7
EC-No.	: 215-222-5
CAS-No.	: 1314-13-2
REACH registration No	: 01-2119463881-32
Product code	: 300000003638
Type of product	: Pure substance
Synonyms	: GMP Pharma, GMP Veterinary, GMP PCA, GMP FCC, ZnO platinum seal, ZnO Gold Seal, ZnO White Seal, ZnO CO-10, ZnO CO-50, Zinc oxide CO, Zinc oxide Pharma, Zinc oxide Green Seal, Zinc oxide Neige, Oxmer 141, Oxmer 142, Oxmer 130, Zinc oxide Oxmer, Zinc oxide Red Seal, Zinc Oxide Pharma-GMP, Agri 80, Afox 80, Zinc Oxide Pharma EP-grade

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

1.2.1. Relevant identified uses

Use of the substance/mixture	: Formulation of preparations Manufacture of substances zinc Use as laboratory reagent Manufacture of substances, Industrial use resulting in inclusion into or onto a matrix Manufacture of substances: Dispersion, Paste, Viscous Liquid
------------------------------	--

Title	Use descriptors
Exposure assessment for Zinc oxide (ZnO) (Association ref code: Annex ZnO)	PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC12, PROC13, PROC14, PROC15, PROC17, PROC19, PROC20, PROC21, PROC22, PROC23, PROC24, PROC26

Full text of use descriptors: see section 16

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

EverZinc Belgium - ZnO
Rue de l'Economie, 4
4431 Loncin - Belgium
T +32 42 90 22 07
Info.MSDS@everzinc.com

1.4. Emergency telephone number

Emergency number	: Africa and Middle East: +44 1865 407333/ Asia Pacific: Australia: +61 2 8014 4558, China: 400 120 6011 (toll-free number), Malaysia: +60 3 6207 4347, Philippines: +63 2 8231 2149, South Korea: +82 2 3479 8401, Rest of Asia Pacific: +44 1865 407333/ Europe: +44 1235 239670/ North America: Mexico: +52 55 5004 8763, Rest of North America: +1 215 207 0061/ South America: Chile. +56 2 2582 9336, Rest of South America: +44 1865 407333 24 Hours 7 days/week
------------------	--

Country	Organisation/Company	Address	Emergency number	Comment
France	ORFILA		+33 1 45 42 59 59	

Zinc Oxide Indirect

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Hazardous to the aquatic environment — Acute Hazard, Category 1 H400

Hazardous to the aquatic environment — Chronic Hazard, Category 1 H410

Full text of H-statements: see section 16

Adverse physicochemical, human health and environmental effects

No additional information available

2.2. Label elements

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

Hazard pictograms (CLP)



GHS09

Signal word (CLP)

: Warning

Hazard statements (CLP)

: H410 - Very toxic to aquatic life with long lasting effects.

Precautionary statements (CLP)

: P273 - Avoid release to the environment.

P391 - Collect spillage.

P501 - Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.

2.3. Other hazards

No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substances

Substance type

: Mono-constituent

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
zinc oxide	CAS-No.: 1314-13-2 EC-No.: 215-222-5 EC Index-No.: 030-013-00-7 REACH-no: 01-2119463881-32	≤ 100	Aquatic Acute 1, H400 Aquatic Chronic 1, H410

Full text of H-statements: see section 16

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general

: First aider: Pay attention to self-protection!

First-aid measures after inhalation

: Remove person to fresh air and keep comfortable for breathing.

First-aid measures after skin contact

: Wash skin with soap and water.

First-aid measures after eye contact

: Rinse eyes with water as a precaution.

First-aid measures after ingestion

: Call a poison center or a doctor if you feel unwell.

Zinc Oxide Indirect

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

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

No additional information available

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

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Water spray. Dry powder. Foam.
Unsuitable extinguishing media : Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition products in case of fire : Toxic fumes may be released.

5.3. Advice for firefighters

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

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures : Ventilate spillage area.

6.1.2. For emergency responders

Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

6.2. Environmental precautions

Avoid release to the environment. Do not allow to enter into surface water or drains.

6.3. Methods and material for containment and cleaning up

For containment : Collect spillage.
Methods for cleaning up : Mechanically recover the product.
Other information : Dispose of materials or solid residues at an authorized site.

6.4. Reference to other sections

For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Ensure good ventilation of the work station. Wear personal protective equipment.
Hygiene measures : Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store in a dry place. Store in a closed container. Store in a well-ventilated place. Keep cool. Protect from heat and direct sunlight.
Incompatible materials : Keep away from oxidizers, strong acids and strong bases.

Zinc Oxide Indirect

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1. National occupational exposure and biological limit values

zinc oxide (1314-13-2)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Zinc oxide
Notes	SCOEL Recommendations(Ongoing)
France - Occupational Exposure Limits	
Local name	Zinc (oxyde de)
VME (OEL TWA)	5 mg/m ³ (fumées) 10 mg/m ³ (poussières)
Note (FR)	Valeurs recommandées/admises

8.1.2. Recommended monitoring procedures

No additional information available

8.1.3. Air contaminants formed

No additional information available

8.1.4. DNEL and PNEC

zinc oxide (1314-13-2)	
DNEL/DMEL (Workers)	
Long-term - systemic effects, dermal	83 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	5 mg/m ³
Long-term - local effects, inhalation	0.5 mg/m ³
DNEL/DMEL (General population)	
Long-term - systemic effects, oral	0.83 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	2.5 mg/m ³
Long-term - systemic effects, dermal	83 mg/kg bodyweight/day
PNEC (Water)	
PNEC aqua (freshwater)	0.0206 mg/l
PNEC aqua (marine water)	0.0061 mg/l
PNEC (Sediment)	
PNEC sediment (freshwater)	117.8 mg/kg dwt
PNEC sediment (marine water)	56.5 mg/kg dwt
PNEC (Soil)	
PNEC soil	35.6 mg/kg dwt
PNEC (Oral)	
PNEC oral (secondary poisoning)	Practically not bioaccumulable

Zinc Oxide Indirect

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

zinc oxide (1314-13-2)	
PNEC (STP)	
PNEC sewage treatment plant	0.052 mg/l

8.1.5. Control banding

No additional information available

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Appropriate engineering controls:

Ensure good ventilation of the workstation.

8.2.2. Personal protection equipment

8.2.2.1. Eye and face protection

Eye protection			
Type	Field of application	Characteristics	Standard
Safety glasses		With side shields	EN 166

8.2.2.2. Skin protection

Skin and body protection	
Type	Standard
Heavy duty work shoes EN ISO 20345-S1	
Personal protective equipment Category II	

Hand protection

Type	Material	Permeation	Thickness (mm)	Penetration	Standard
Disposable gloves	Nitrile rubber (NBR)		0.11		EN ISO 374

Other skin protection

Materials for protective clothing:

Wear protective clothing

8.2.2.3. Respiratory protection

Respiratory protection:

In case of insufficient ventilation, wear suitable respiratory equipment

Respiratory protection			
Device	Filter type	Condition	Standard
Effective dust mask Personal protective equipment Category III, (FFP3) EN 149 2001 + A1: 2009			
Wear appropriate breathing apparatus if air renewal not sufficient to maintain dust/vapour under TLV			

8.2.2.4. Thermal hazards

No additional information available

8.2.3. Environmental exposure controls

Environmental exposure controls:

Avoid release to the environment.

Zinc Oxide Indirect

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Solid
Appearance	: Powder.
Molecular mass	: 81.39 g/mol
Colour	: white.
Odour	: odourless.
Odour threshold	: Not applicable
pH	: Not applicable
Relative evaporation rate (butylacetate=1)	: Not applicable
Melting point	: Not determined
Freezing point	: No data available
Boiling point	: No data available (test not performed)
Flash point	: No data available
Auto-ignition temperature	: No data available
Decomposition temperature	: Not applicable
Flammability (solid, gas)	: Not applicable
Vapour pressure	: Not applicable
Relative vapour density at 20 °C	: Not applicable
Relative density	: No data available
Density	: 5.61 g/cm ³
Solubility	: Water: Insoluble
Partition coefficient n-octanol/water (Log Pow)	: Not applicable
Viscosity, kinematic	: No data available
Viscosity, dynamic	: Not applicable (solid)
Explosive properties	: Not applicable.
Oxidising properties	: No data available
Lower explosive limit (LEL)	: Not applicable
Upper explosive limit (UEL)	: Not applicable

9.2. Other information

VOC content	: Not applicable
-------------	------------------

SECTION 10: Stability and reactivity

10.1. Reactivity

The product is non-reactive under normal conditions of use, storage and transport.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

May react violently with alkali/alkaline earth metals.

10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

10.5. Incompatible materials

Keep away from oxidizers, strong acids and strong bases.

10.6. Hazardous decomposition products

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

Zinc Oxide Indirect

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral) : Not classified
Acute toxicity (dermal) : Not classified
Acute toxicity (inhalation) : Not classified

zinc oxide (1314-13-2)

LD50 oral rat	> 5000 mg/kg (Equivalent or similar to OECD 401, Rat, Male / female, Experimental value, Oral, 14 day(s))
LD50 dermal rat	> 2000 mg/kg bodyweight (OECD 402: Acute Dermal Toxicity, 24 h, Rat, Male / female, Experimental value, Dermal, 14 day(s))
LC50 Inhalation - Rat	> 5.7 mg/l (Equivalent or similar to OECD 403, 4 h, Rat, Male / female, Experimental value, Inhalation (dust), 14 day(s))

Skin corrosion/irritation : Not classified
pH: Not applicable
Serious eye damage/irritation : Not classified
pH: Not applicable
Respiratory or skin sensitisation : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified
Reproductive toxicity : Not classified
STOT-single exposure : Not classified
STOT-repeated exposure : Not classified (Annex VI reference classification).

zinc oxide (1314-13-2)

LOAEL (dermal, rat/rabbit, 90 days)	75 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 410 (Repeated Dose Dermal Toxicity: 21/28-Day Study)
NOAEL (oral, rat, 90 days)	31.52 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 408 (Repeated Dose 90-Day Oral Toxicity in Rodents)

Aspiration hazard : Not classified
Potential adverse human health effects and symptoms : Non-toxic if swallowed (LD50 oral, rat > 5000 mg/kg), Not irritant to skin, Practically non-toxic in contact with skin (LD50 skin > 2000 mg/kg), Practically non-toxic by inhalation (LC50 inh, rat > 5 mg/l/4h), Not irritant to eyes

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : Dangerous for the environment. Very toxic to aquatic life with long lasting effects.
Hazardous to the aquatic environment, short-term (acute) : Very toxic to aquatic life.
Hazardous to the aquatic environment, long-term (chronic) : Very toxic to aquatic life with long lasting effects.
Not rapidly degradable

zinc oxide (1314-13-2)

LC50 - Fish [1]	0.169 mg/l <i>Oncorhynchus mykiss</i> (Rainbow trout)
EC50 - Crustacea [1]	1 mg/l (OECD 202: <i>Daphnia</i> sp. Acute Immobilisation Test, 48 h, <i>Daphnia magna</i> , Static system, Fresh water, Experimental value, Zinc ion)
NOEC chronic algae	0.0299 mg/l

Zinc Oxide Indirect

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

12.2. Persistence and degradability

zinc oxide (1314-13-2)

Chemical oxygen demand (COD)	Not applicable (inorganic)
ThOD	Not applicable (inorganic)

12.3. Bioaccumulative potential

zinc oxide (1314-13-2)

BCF - Fish [1]	78 – 2060 (14 day(s), Oncorhynchus mykiss, Semi-static system, Fresh water, Experimental value)
Partition coefficient n-octanol/water (Log Pow)	Not applicable

12.4. Mobility in soil

zinc oxide (1314-13-2)

Surface tension	Not applicable (solid)
Partition coefficient n-octanol/water (Log Koc)	2.2 (log Koc, Literature study)
Ecology - soil	Low potential for adsorption in soil.

12.5. Results of PBT and vPvB assessment

No additional information available

12.6. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods : Dispose of contents/container in accordance with licensed collector's sorting instructions.

SECTION 14: Transport information






In accordance with ADR / IMDG / IATA / ADN / RID

ADR	IMDG	IATA	ADN	RID
14.1. UN number				
UN 3077	UN 3077	UN 3077	UN 3077	UN 3077
14.2. UN proper shipping name				
ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide)	Environmentally hazardous substance, solid, n.o.s. (Zinc oxide)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide)
Transport document description				
UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide), 9, III, (E)	UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide), 9, III, MARINE POLLUTANT	UN 3077 Environmentally hazardous substance, solid, n.o.s. (Zinc oxide), 9, III	UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide), 9, III	UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide), 9, III

Zinc Oxide Indirect


Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

ADR	IMDG	IATA	ADN	RID
14.3. Transport hazard class(es)				
9	9	9	9	9
				
14.4. Packing group				
III	III	III	III	III
14.5. Environmental hazards				
Dangerous for the environment: Yes	Dangerous for the environment: Yes Marine pollutant: Yes	Dangerous for the environment: Yes	Dangerous for the environment: Yes	Dangerous for the environment: Yes
No supplementary information available				

14.6. Special precautions for user

Overland transport

Classification code (ADR)	: M7
Special provisions (ADR)	: 274, 335, 601, 375
Limited quantities (ADR)	: 5kg
Excepted quantities (ADR)	: E1
Packing instructions (ADR)	: P002, IBC08, LP02, R001
Mixed packing provisions (ADR)	: MP10
Portable tank and bulk container instructions (ADR)	: T1, BK1, BK2
Portable tank and bulk container special provisions (ADR)	: TP33
Tank code (ADR)	: SGAV, LGBV
Vehicle for tank carriage	: AT
Transport category (ADR)	: 3
Special provisions for carriage - Packages (ADR)	: V13
Special provisions for carriage - Bulk (ADR)	: VC1, VC2
Special provisions for carriage - Loading, unloading and handling (ADR)	: CV13
Hazard identification number (Kemler No.)	: 90
Orange plates	: 

Tunnel restriction code (ADR) : E

Transport by sea

Special provisions (IMDG)	: 274, 335, 966, 967, 969
Limited quantities (IMDG)	: 5 kg
Excepted quantities (IMDG)	: E1
Packing instructions (IMDG)	: P002, LP02
Special packing provisions (IMDG)	: PP12
IBC packing instructions (IMDG)	: IBC08
IBC special provisions (IMDG)	: B3
Tank instructions (IMDG)	: T1, BK1, BK2, BK3
Tank special provisions (IMDG)	: TP33
EmS-No. (Fire)	: F-A
EmS-No. (Spillage)	: S-F
Stowage category (IMDG)	: A
Stowage and handling (IMDG)	: SW23
MFAG-No	: 171

Zinc Oxide Indirect

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

Air transport

PCA Excepted quantities (IATA)	: E1
PCA Limited quantities (IATA)	: Y956
PCA limited quantity max net quantity (IATA)	: 30kgG
PCA packing instructions (IATA)	: 956
PCA max net quantity (IATA)	: 400kg
CAO packing instructions (IATA)	: 956
CAO max net quantity (IATA)	: 400kg
Special provisions (IATA)	: A97, A158, A179, A197
ERG code (IATA)	: 9L

Inland waterway transport

Classification code (ADN)	: M7
Special provisions (ADN)	: 274, 335, 375, 601
Limited quantities (ADN)	: 5 kg
Excepted quantities (ADN)	: E1
Carriage permitted (ADN)	: T* B**
Equipment required (ADN)	: PP, A
Number of blue cones/lights (ADN)	: 0

Rail transport

Classification code (RID)	: M7
Special provisions (RID)	: 274, 335, 375, 601
Limited quantities (RID)	: 5kg
Excepted quantities (RID)	: E1
Packing instructions (RID)	: P002, IBC08, LP02, R001
Special packing provisions (RID)	: PP12, B3
Mixed packing provisions (RID)	: MP10
Portable tank and bulk container instructions (RID)	: T1, BK1, BK2
Portable tank and bulk container special provisions (RID)	: TP33
Tank codes for RID tanks (RID)	: SGAV, LGBV
Transport category (RID)	: 3
Special provisions for carriage – Packages (RID)	: W13
Special provisions for carriage – Bulk (RID)	: VC1, VC2
Special provisions for carriage - Loading, unloading and handling (RID)	: CW13, CW31
Colisexpress (express parcels) (RID)	: CE11
Hazard identification number (RID)	: 90

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

Not applicable

SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

No REACH Annex XVII restrictions

zinc oxide is not on the REACH Candidate List

zinc oxide is not on the REACH Annex XIV List

Zinc Oxide Indirect is not subject to Regulation (EU) No 649/2012 of the European Parliament and of the Council of 4 July 2012 concerning the export and import of hazardous chemicals.

Zinc Oxide Indirect is not subject to Regulation (EU) No 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants

VOC content : Not applicable

Zinc Oxide Indirect

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

Directive 2012/18/EU (SEVESO III)

Seveso III Part I (Categories of dangerous substances)	Qualifying quantity (tonnes)	
	Lower-tier	Upper-tier
E1 Hazardous to the Aquatic Environment in Category Acute 1 or Chronic 1	100	200

15.1.2. National regulations

Listed on the United States TSCA (Toxic Substances Control Act) inventory
Listed on the Canadian DSL (Domestic Substances List)
Listed introduction on Australian Industrial Chemicals Introduction Scheme (AICIS Inventory)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on KECL/KECI (Korean Existing Chemicals Inventory)
Subject to reporting requirements of United States SARA Section 313

15.2. Chemical safety assessment

A chemical safety assessment has been carried out

SECTION 16: Other information

Indication of changes			
Section	Changed item	Change	Comments
	Supersedes	Modified	
	Revision date	Modified	
1.1	Synonyms	Modified	
2.1	Classification according to Regulation (EC) No. 1272/2008 [CLP]	Modified	
2.2	Precautionary statements (CLP)	Modified	
15.1	Regulatory reference	Modified	

Abbreviations and acronyms

ACGIH	American Conference of Government Industrial Hygienists
ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE	Acute Toxicity Estimate
BCF	Bioconcentration factor
CLP	Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
DMEL	Derived Minimal Effect Level
DNEL	Derived-No Effect Level
DPD	Dangerous Preparations Directive 1999/45/EC
DSD	Dangerous Substances Directive 67/548/EEC
IARC	International Agency for Research on Cancer
EC50	Median effective concentration
IATA	International Air Transport Association

Zinc Oxide Indirect

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

Abbreviations and acronyms	
IMDG	International Maritime Dangerous Goods
LC50	Median lethal concentration
LD50	Median lethal dose
LOAEL	Lowest Observed Adverse Effect Level
NOAEC	No-Observed Adverse Effect Concentration
NOAEL	No-Observed Adverse Effect Level
NOEC	No-Observed Effect Concentration
OECD	Organisation for Economic Co-operation and Development
OEL	Occupational Exposure Limits
OSHA	Occupational Safety Health Administration
PBT	Persistent Bioaccumulative Toxic
PNEC	Predicted No-Effect Concentration
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
SDS	Safety Data Sheet
STP	Sewage treatment plant
TLM	Median Tolerance Limit
TWA	Time Weighted Average
BLV	Biological limit value
CAS-No.	Chemical Abstract Service number
EC-No.	European Community number
EN	European Standard
vPvB	Very Persistent and Very Bioaccumulative
WGK	Water Hazard Class

Full text of H- and EUH-statements	
Aquatic Acute 1	Hazardous to the aquatic environment — Acute Hazard, Category 1
Aquatic Chronic 1	Hazardous to the aquatic environment — Chronic Hazard, Category 1
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Full text of use descriptors	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC10	Roller application or brushing
PROC11	Non industrial spraying
PROC12	Use of blowing agents in manufacture of foam
PROC13	Treatment of articles by dipping and pouring
PROC14	Tableting, compression, extrusion, pelettisation, granulation
PROC15	Use as laboratory reagent

Zinc Oxide Indirect

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

Full text of use descriptors	
PROC17	Lubrication at high energy conditions in metal working operations
PROC19	Manual activities involving hand contact
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC20	Use of functional fluids in small devices
PROC21	Low energy manipulation and handling of substances bound in/on materials or articles
PROC22	Manufacturing and processing of minerals and/or metals at substantially elevated temperature
PROC23	Open processing and transfer operations at substantially elevated temperature
PROC24	High (mechanical) energy work-up of substances bound in /on materials and/or articles
PROC26	Handling of solid inorganic substances at ambient temperature
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC4	Chemical production where opportunity for exposure arises
PROC5	Mixing or blending in batch processes
PROC6	Calendering operations
PROC7	Industrial spraying
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

The classification complies with : ATP 12

Safety Data Sheet (SDS), EU

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

Zinc Oxide Indirect

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

Annex to the safety data sheet

Table of contents of the Annex

Identified Uses	Es N°	Association ref code
Exposure assessment for Zinc oxide (ZnO)	1	Annex ZnO

Exposure assessment for Zinc oxide (ZnO)

For assessment of exposures at local scale, several generic exposure scenarios (GES) were developed in the chemical safety report (CSR). The multitude of identified uses was assigned to the respective GES based on similarity of process, and, consequently, similarity in exposure and risk management measures. So, GES are relevant for the different identified uses that they group at the same time.

Approaches for local exposure assessment

- Assessment of workers exposure is related to the place /process the worker is involved in. The GES group different processes; exposure assessment is done using the worst case approach by considering full shift exposure at the workplace with highest potential for exposure. Risk management measures are specified accordingly.
- Environmental emissions (notably to water) are usually integrating the totality of emissions from a given site, and cannot be distinguished for each process. Therefore assessments in the GES are done for the site as a whole.

How to identify the GES related to a given use?

In table below, the generic exposure scenarios (GES) developed for ZnO are presented.

Table: Generic exposure scenarios (GES) for ZnO (ref : CSR zinc oxide, version Nov 2010)

Number	Sector	Uses	Code
0	Zinc oxide production	Manufacture Substance	GES _{ZnO} 0
1	Formulation step	Formulation general	GES _{ZnO} 1
2	First tier applications	Manufacturing of other zinc compounds	GES _{ZnO} 2
3		Laboratory reagent	GES _{ZnO} 3
4		As component for solid blends & matrices	GES _{ZnO} 4
5		As component for production of dispersions, pastes and other viscous matrices	GES _{ZnO} 5
6		Second tier applications	DU of ZnO-containing solid preparations
7	DU of ZnO-containing liquid & pasty preparations		GES _{ZnO} 7

To facilitate the identification of the GES related to a given downstream use, the table below lists the different uses that were identified for ZnO. In this table, the downstream user can look up its use(s) and find the corresponding GES for attachment to his e-SDS.

Table: Identified uses for ZnO and corresponding Generic Exposure Scenario (GES) (ref: CSR zinc oxide, version Nov 2010)

IU number	Identified Use (IU) name	GES code
1	Zinc oxide production-Direct	GESZnO 0
2	Zinc oxide production-Indirect	GESZnO 0
3	Zinc oxide production-Wet	GESZnO 0
9	Component for production of inorganic zinc compounds	GESZnO 2
10	Electrogalvanizing	GESZnO 2
11	Electroplating	GESZnO 2
12	Zinc production by electrowinning	GESZnO 2
13	Laboratory reagent	GESZnO 3
14	Zinc production by pyrometallurgy	GESZnO 2
15	Zinc oxide production & refining	GESZnO 0
16	Component for production of organic zinc compounds	GESZnO 2
17	Component for production of Inorganic pigments	GESZnO 1, GESZnO 4
18	Component for production of Coatings / paints, inks, enamels, varnishes	GESZnO 1, GESZnO 4
19	Use of ZnO-containing paints & coatings	GESZnO 7
20	Artists supply: Use of ZnO-containing paints & coatings	Generic consumer/environment*
21	Component for Paper coating	GESZnO 1, GESZnO 5
22	Use of ZnO-containing paper coatings	GESZnO 6
23	Component for Textile & leather coating / treatment	GESZnO 1, GESZnO 5
24	Use of ZnO-containing textile & leather coatings	GESZnO 6
25	Additive / component for production of ceramics	GESZnO 1, GESZnO 4
26	Additive /component for production of frits	GESZnO 1, GESZnO 4
27	Use of ZnO-containing glazes and glassy thin film coatings	GESZnO 6
28	Additive for the production of Friction agents	GESZnO 1, GESZnO 4
29	Use of ZnO-containing friction agents: Brake pads	GESZnO 6
30	Additive / component for production of glass	GESZnO 1, GESZnO 4
31	Surface treatment of flat glass	GESZnO 1, GESZnO 4
32	Use of ZnO-containing glass & ceramics in dinnerware	GESZnO 6
33	Use of ZnO-containing glass in displays	GESZnO 6
34	Use of ZnO-containing glassy thin film coatings	GESZnO 6
35	Additive in the manufacturing of electronic components	GESZnO 1, GESZnO 4
36	Additive in the manufacturing of ferrites	GESZnO 1, GESZnO 4
37	Additive in the manufacturing of varistors	GESZnO 1, GESZnO 4
38	ZnO in electrotechnical contact material	GESZnO 1, GESZnO 4

IU number	Identified Use (IU) name	GES code
39	Batteries/Fuel cells	GESZnO 1, GESZnO 4, GESZnO 5
40	Component for production of rubber, resins and related preparations	GESZnO 1, GESZnO 5
41	Use of ZnO-containing rubber for tyres	GESZnO 7
42	Use of ZnO-containing rubber and other resins for medical devices and applications	GESZnO 7
43	Component for polymer-matrices, plastics and related preparations	GESZnO 1, GESZnO 5
44	Use of ZnO-containing polymers for floor, wall coverings and similar preparations	GESZnO 7
45	Use of ZnO-containing polymers for cable protecting & isolating coatings	GESZnO 7
46	Use of ZnO-containing polymers for tube & sheet articles	GESZnO 7
47	Use of ZnO-containing polymers for molded articles	GESZnO 7
48	Use of ZnO-containing plastic thin films coatings	Generic consumer/environment
49	Additive for the production of Sealants / Adhesives / Mastics	GESZnO 1, GESZnO 5
50	Use of ZnO-containing Sealants / Adhesives / Mastics	Generic consumer/environment
51	Additive for the production of Lubricants / Grease / Metal working fluids	GESZnO 1, GESZnO 5
52	Use of ZnO-containing Lubricants / Grease / Metal working fluids	Generic consumer/environment
53	Additive for the production of Polishes / wax blends	GESZnO 1, GESZnO 5
54	Use of ZnO-containing Polishes/ wax blends	Generic consumer/environment
55	Use of ZnO-containing catalysts	GESZnO 1, GESZnO 5
56	Use of ZnO-containing adsorbents	GESZnO 1, GESZnO 5
57	Additive for production of de-icing products	GESZnO 1, GESZnO 5
58	Use of ZnO-containing de-icing products	Generic consumer/environment
59	Additive for the production of pyrotechnic products	GESZnO 1, GESZnO 4
60	Use of ZnO-containing pyrotechnic products	Generic consumer/environment
61	Additive for the formulation of nutrition additives	GESZnO 1, GESZnO 4, GESZnO 5
62	Additive for the formulation of animal feedstuffs	GESZnO 1, GESZnO 4, GESZnO 5
63	Additive for the formulation of biocidal products	GESZnO 1, GESZnO 4, GESZnO 5
64	Use of ZnO-containing biocidal products	GESZnO 6, GESZnO 7, Generic consumer/environment
65	Additive for the formulation of cleaning products	GESZnO 1, GESZnO 4, GESZnO 5
66	Use of ZnO-containing cleaning products	GESZnO 6, GESZnO 7, Generic consumer/environment
67	Additive for the formulation of fertilizers	GESZnO 1, GESZnO 4, GESZnO 5
68	Use of ZnO-containing fertilizer's formulations	Generic consumer/environment

IU number	Identified Use (IU) name	GES code
69	Additive in the formulation of cosmetics	GESZnO 1, GESZnO 4, GESZnO 5
70	Use of cosmetics	GESZnO 6, GESZnO 7, Generic consumer/environment
71	Additive in dentistry products	GESZnO 1, GESZnO 4, GESZnO 5
72	Additive in the formulation of pharma / veterinary products	GESZnO 1, GESZnO 4, GESZnO 5
73	Use of pharma / veterinary products	GESZnO 6, GESZnO 7, Generic consumer/environment

GES ZnO-0: Industrial use of primary or secondary zinc bearing material in the manufacture of ZnO by several pyro-or hydrometallurgical processes.

SU: 3, 8, 9

PROC: 1, 2, 3, 4,5 , 8b, 9, 22, 26

PC: 19, 20

AC: not applicable

ERC: 1, 6a

Description of activities and processes covered in the exposure scenario:

There are 3 production processes for ZnO:

- **the indirect process**

In this process, the starting material is zinc metal (with a purity of 92 – 99.995 %), refined metal, metallic residues and scrap.

The zinc metal is melted, vaporised by boiling and oxidised in the vapour state to zinc oxide with excess of air.

Afterwards, the zinc vapour is burned (oxidised) to produce zinc oxide, which is quenched in excess of air, precipitated from the ZnO/air mixture in settling chambers, in which the fractionation of the zinc oxide particles takes place according to their size.

- **the direct process**

In this process, the starting material is zinc oxide containing residue.

The material is blended with reducing agent (coke breeze) and fed to a furnace. At elevated temperature (~1000°C); the ZnO is reduced to Zinc which vaporises by boiling at that temperature. Air is blown above the surface and oxidises Zinc in the vapour state to Zinc oxide which is entrained in the exhaust airflow.

The entrained Zinc oxide is quenched in excess of air, precipitated from that ZnO/air mixture in settling chambers, in which the fractionation of the zinc oxide particles takes place according to their size.

- **the wet process**

In this process, the starting material is a purified zinc salt solution (predominantly dithionate, sulphate or chloride).

Zinc hydroxide and/or carbonate are subsequently precipitated by the addition of alkalines and filtered from the solutions.

Finally, zinc oxide is generated by calcination (dehydration, de-carboxylation) of the Zinc hydroxide or Zinc carbonate or a mixture of both.

The resulting zinc oxide is subsequently collected in bag filters after cooling the exhaust air, and is then packed, as such in powdery form, into paper sacks or big bags, or further granulated before packaging

Contributing scenario (1) controlling environmental exposure

Product characteristics: see sections 3 (composition) & 9 (phys-chem properties) of SDS

ZnO is produced in minimum 80% purity

Amounts used: maximum 50000 T/y

Frequency and duration of use: Continuous production
Environment factors not influenced by risk management: Flow rate receiving waters default for generic scenario: 18,000 m ³ /d, unless specified otherwise
Other given operational conditions affecting environmental exposure: <ul style="list-style-type: none"> • In the wet process, most of the operations are in wet phase. • In the direct and indirect dry process, all operational conditions are dry throughout the process; there are no process waters; high temperature steps; • Even when no process waters (e.g. when dry process throughout), some non-process water can be generated containing zinc (e.g. from cleaning) • All processes are performed indoor in a confined area. All residues containing zinc are recycled.
Technical conditions and measures at process level (source) to prevent release: See MSDS section 8.2.3
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil: See section 8.2.3 of SDS
Organizational measures to prevent/limit release from site: See section 8.2.3 of SDS
Conditions and measures related to municipal sewage treatment plant: In cases where applicable: default size of the municipal STP (2000 m ³ /d), unless specified otherwise.
Conditions and measures related to external treatment of waste for disposal: If any, all hazardous wastes are treated by certified contractors according to EU and national legislation.
Conditions and measures related to external recovery of waste: <ul style="list-style-type: none"> • All residues from the wet process are recycled. • By-products (ashes) from the dry process that are formed in the reactor are recovered and either recycled in the system or handled further according the waste legislation. • Users of Zn and Zn-compounds have to favour the recycling channels of the end-of-life products • Users of Zn and Zn-compounds have to minimize Zn-containing waste, promote recycling routes and, for the remaining, dispose the waste streams according the Waste regulation.
Contributing scenario (2) controlling worker exposure
Product characteristics: see sections 3 (composition) & 9 (phys-chem properties) of SDS ZnO (100%) as solid (dry powder) The manufactured zinc oxide is collected in bag filters after cooling the exhaust air, and is then packed, as such in powdery form, into paper sacks or big bags, or further granulated before packaging.
Amounts used: Maximum 96 T/day, 32T/shift
Frequency and duration of use/exposure: 8hrs shift
Human factors not influenced by risk management: Uncovered body parts, (potentially) face can be exposed due to nature of activity
Other given operational conditions affecting workers exposure: All processes are carried out indoor in confined areas.
Technical conditions and measures at process level (source) to prevent release: See MSDS section 8.2.1
Technical conditions and measures to control dispersion from source towards the worker: See MSDS section 8.2.1
Organisational measures to prevent /limit releases, dispersion and exposure: See MSDS section 8.2.1
Conditions and measures related to personal protection, hygiene and health evaluation: <ul style="list-style-type: none"> • Wearing of gloves and protective clothing is compulsory (efficiency >=90%). • With normal handling, no respiratory personal protection (breathing apparatus) is necessary. If risk for exceedance of OEL/DNEL, use mask as described in MSDS section 8.2.2 • Eyes: safety glasses are optional

Exposure estimation and reference to its source: not relevant, refer to CSR.

Risks for workers and to the environment have to be assessed considering the PNECs and DNELs mentioned under SDS sections 8.1.4.

Guidance to DU to evaluate whether he works inside the boundaries set by the (G)ES.

Occupational exposure/environmental emissions

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). Environmental and human exposure can be measured or modelled (more information on tools available in SDS section 8.1.4.).

In addition, bioavailability corrections can be integrated in the exposure assessment, if the environmental parameters that are needed for the calculations are documented (see SDS section 8.1.4.)

ZnO GES-1: Industrial use of ZnO in the formulation of preparations by mixing thoroughly, dry or in a solvent, the starting materials with potentially pressing, pelletizing, sintering, and possibly followed by packaging.
SU: 3,8,9, 10 PROC: 1,2,3,4,5, 8b,9,13, 14, 15, 22,26 PC: Not applicable AC: not applicable ERC: 1,2, 6a
In the described process, the zinc oxide is: <ul style="list-style-type: none"> Removed from the packaging and stored in silos after delivery. Extracted from the silo, dosed and fed with the other reagents to the mixing tank. Mixing occurs batch-wise or continuously, according the process receipt. The mixing occurs in a closed tank/chamber. The preparation (dry or wet (solvent/paste) matrix) is further used as such or packed for further treatment/use.
Contributing scenario (1) controlling environmental exposure
Product characteristics: see sections 3 (composition) & 9 (phys-chem properties) of SDS, ZnO is used in minimum 80% purity
Amounts used: maximum 5000 T/y
Frequency and duration of use Continuous production is assumed as a worst case. It is possible that use is not continuous; this has to be considered when estimating exposure.
Environment factors not influenced by risk management Flow rate receiving waters default for generic scenario: 18,000 m3/d, unless specified otherwise
Other given operational conditions affecting environmental exposure <ul style="list-style-type: none"> All processes are performed indoor in a confined area. High temperature steps are possible. All residues containing zinc are recycled. Even when no process waters (e.g. when dry process throughout), some non-process water can be generated containing zinc(e.g. from cleaning)
Technical conditions and measures at process level (source) to prevent release: see MSDS section 8.2.3
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil: see MSDS section 8.2.3
Organizational measures to prevent/limit release from site: see MSDS section 8.2.3

<p>Conditions and measures related to municipal sewage treatment plant: In cases where applicable: default size of the municipal STP (2000 m³/d), unless specified otherwise.</p>
<p>Conditions and measures related to external treatment of waste for disposal:</p> <ul style="list-style-type: none"> • If any, all hazardous wastes are treated by certified contractors according to EU and national legislation. • Users of Zn and Zn-compounds have to favour the recycling channels of the end-of-life products • Users of Zn and Zn-compounds have to minimize Zn-containing waste, promote recycling routes and, for the remaining, dispose the waste streams according the Waste regulation.
<p>Conditions and measures related to external recovery of waste: All residues are recycled or handled and conveyed according to the waste legislation.</p>
<p>Contributing scenario (2) controlling worker exposure</p>
<p>Product characteristic: see sections 3 (composition) & 9 (phys-chem properties) of SDS The preparation can be solid or liquid. When the preparation is in solid state, it can be in a) powdery, b) glassy or c) pelletized form. In the powder form, it can be characterised by high dustiness in a worst case situation.</p>
<p>Amounts used: Max 5000T/y = 14T/d = 5T/shift depending on the application.</p>
<p>Frequency and duration of use/exposure: 8 hour shifts (default worst case) are assumed as starting point; it is emphasised that the real duration of exposure could be less. This has to be considered when estimating exposure.</p>
<p>Human factors not influenced by risk management: Uncovered body parts, (potentially) face can be exposed due to nature of activity</p>
<p>Other given operational conditions affecting workers exposure:</p> <ul style="list-style-type: none"> • high temperature steps can occur; • all indoor processes in confined area.
<p>Technical conditions and measures at process level (source) to prevent release: See MSDS section 8.2.1</p>
<p>Technical conditions and measures to control dispersion from source towards the worker: See MSDS section 8.2.1</p>
<p>Organisational measures to prevent /limit releases, dispersion and exposure: See MSDS section 8.2.1</p>
<p>Conditions and measures related to personal protection, hygiene and health evaluation:</p> <ul style="list-style-type: none"> • Wearing of gloves and protective clothing is compulsory (efficiency >=90%). • With normal handling, no respiratory personal protection (breathing apparatus) is necessary. If risk for exceedance of OEL/DNEL, use mask as described in MSDS section 8.2.2 • Eyes: safety glasses are optional

Exposure estimation and reference to its source: not relevant, refer to CSR.

Risks for workers and to the environment have to be assessed considering the PNECs and DNELs mentioned under SDS sections 8.1.4.

Guidance to DU to evaluate whether he works inside the boundaries set by the (G)ES.

Occupational exposure/environmental emissions

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). Environmental and human exposure can be measured or modelled (more information on tools available in SDS section 8.1.4.).

In addition, bioavailability corrections can be integrated in the exposure assessment, if the environmental parameters that are needed for the calculations are documented (see SDS section 8.1.4.)

GES ZnO-2: industrial use of zinc oxide or ZnO-formulations in the manufacturing of other inorganic or organic zinc substances through different process routes, with potentially drying, calcining and packaging.

SU: 3, 8, 9, 10, 14, 15,17, 0 (Nace C24. 4.3., E38.3, C25. 6.1)

PROC: 1, 2, 3, 4, 8b, 9, 13, 15, 21, 22, 23, 26

PC : 7, 14, 19, 20, 21

AC : 2, 7, 12

ERC : 1, 2, 4, 5, 6a, 6b, 8a, 8d

Description of activities/process(es) covered in the Exposure Scenario

- Reception of the ZnO or ZnO-containing formulation, or ZnO-bearing raw material in the reaction tank
- Sequential addition of reagents for purification steps and filtration on press filter, when needed (ventilation is adapted).
- Concentration by water evaporation, under exhaust hood.
- Possible pouring on a cooling belt
- Discharge and packaging of produced zinc compounds. Workers have to place and adjust the bag or drum under the discharge pipe and to set the process in motion. Filled bags or drums are subsequently closed and carried to the storage area.
- Exposure to dust can occur during packing of the powder. Solutions are packed in intermediate bulk containers (ca. 1 m3 capacity); solids are packed in bags or drums.
- Maintenance activities

Contributing scenario (1) controlling environmental exposure

Product characteristics: see sections 3 (composition) & 9 (phys-chem properties) of SDS

Zn-compounds are produced in their pure form e.g; >99%, or in solution.

Amounts used: Up to 75 T/d of ZnO is transformed to equivalent Zn compound

Frequency and duration of use: Continuous production is assumed as a worst case. It is possible that use is not continuous; this has to be considered when estimating exposure.

Environment factors not influenced by risk management

Flow rate of receiving surface water usually 18,000 m3/d by default, unless specified otherwise

Other given operational conditions affecting environmental exposure

- Wet processes (leaching, filtering, purification) followed by drying (possible grinding), and packaging;
- All indoor processes, in confined area.

Technical conditions and measures at process level (source) to prevent release: see SDS section 8.2.3

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil: see SDS section 8.2.3.

Organizational measures to prevent/limit release from site: see SDS section 8.2.3

Conditions and measures related to municipal sewage treatment plant:

In cases where applicable: default size of the municipal STP (2000 m3/d), unless specified otherwise.

Conditions and measures related to external treatment of waste for disposal:

- If any, all hazardous wastes are treated by certified contractors according to EU and national legislation.
- Users of Zn and Zn-compounds have to favour the recycling channels of the end-of-life products
- Users of Zn and Zn-compounds have to minimize Zn-containing waste, promote recycling routes and, for the remaining, dispose the waste streams according the Waste regulation.

Conditions and measures related to external recovery of waste:

- All residues from the wet process are recycled.
- Users of Zn and Zn-compounds have to favour the recycling channels of the end-of-life products
- Users of Zn and Zn-compounds have to minimize Zn-containing waste, promote recycling routes and, for the remaining, dispose the waste streams according the Waste regulation.

Contributing scenario (2) controlling worker exposure
<p>Product characteristic: see sections 3 (composition) & 9 (phys-chem properties) of SDS</p> <ul style="list-style-type: none"> • Zinc oxide is transformed to equivalent pure zinc compound. • The formed zinc compound can be produced as a powder with varying particle size (worst case scenario) or can be in solution.
Amounts used: Up to maximum 25T/shift
Frequency and duration of use/exposure: 8hrs shift (worst case)
Human factors not influenced by risk management: Uncovered body parts, (potentially) face can be exposed due to nature of activity
<p>Other given operational conditions affecting workers exposure:</p> <p>All processes are carried out indoor in confined areas.</p>
Technical conditions and measures at process level (source) to prevent release: see section 8.2.1. of SDS
Organisational measures to prevent /limit releases, dispersion and exposure: see section 8.2.1 of SDS
<p>Conditions and measures related to personal protection, hygiene and health evaluation:</p> <ul style="list-style-type: none"> • Wearing of gloves and protective clothing is compulsory (efficiency >=90%) • With normal handling, no respiratory personal protection (breathing apparatus) is necessary. If risk for exceedance of OEL/DNEL, use filter masks as described in section 8.2.2. of SDS • Eyes: safety glasses are optional

Exposure estimation and reference to its source: not relevant, refer to CSR.

Risks for workers and to the environment have to be assessed considering the PNECs and DNELs mentioned under SDS sections 8.1.4.

Guidance to DU to evaluate whether he works inside the boundaries set by the (G)ES.

Occupational exposure/environmental emissions

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). Environmental and human exposure can be measured or modelled (more information on tools available in SDS section 8.1.4.).

In addition, bioavailability corrections can be integrated in the exposure assessment, if the environmental parameters that are needed for the calculations are documented (see SDS section 8.1.4.).

GES ZnO-3: Industrial and professional use of ZnO as active laboratory reagent in aqueous or organic media, for analysis or synthesis.
<p>SU: 3, 10, 22, 24</p> <p>PROC: 1, 2, 3, 4, 5, 8b, 9, 15</p> <p>PC: 19, 21, 28, 39</p> <p>AC: not applicable</p> <p>ERC: 1,2, 4, 6a, 6b, 8a, 8b, 8d</p>
Contributing scenario (1) controlling environmental exposure
<p>The zinc oxide is used for:</p> <p><u>Analysis:</u> sample (solid or liquid) treatment or preparation: the substance is in the sample or in the reagent</p> <p><u>Synthesis:</u> manipulations are usually under ventilation (e.g. laminar flow, ventilation hood)</p> <p>The substance is used at the industrial scale, in industrial installations for air control and water treatment and at the professional scale by laboratories</p>
Product characteristics: see sections 3 (composition) & 9 (phys-chem properties) of SDS

<p>Amounts used:</p> <ul style="list-style-type: none"> • maximum 5 T/y (industrial scale) • maximum 0.5 T/y (professional scale)
<p>Frequency and duration of use: Use is usually intermittent but continuous use is assumed as a worst case.</p>
<p>Environment factors not influenced by risk management</p> <p>Flow rate of receiving surface water: default for generic scenario: 18,000 m³/d, unless specified otherwise</p>
<p>Other given operational conditions affecting environmental exposure</p> <p>All processes are performed indoor in a confined area, with dedicated laboratory equipment. All solid residues containing zinc are recovered for recycling.</p>
<p>Technical conditions and measures at process level (source) to prevent release: see section 8.2.3 of SDS</p>
<p>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</p> <ul style="list-style-type: none"> • Industrial scale: please refer to section 8.2.3. of SDS • At professional scale, the emissions are treated usually by STP. Professional services will be used for treating waste streams e.g. for the recovery of metallic solids (for recycling), and for the recovery of e.g. acid solutions containing the substance.
<p>Organizational measures to prevent/limit release from site: see section 8.2.3 of SDS</p>
<p>Conditions and measures related to municipal sewage treatment plant: In cases where applicable: default size (2000 m³/d), unless specified otherwise.</p>
<p>Conditions and measures related to external treatment of waste for disposal:</p> <ul style="list-style-type: none"> • If any, all hazardous wastes are treated by certified contractors according to EU and national legislation. • Users of Zn and Zn-compounds have to favour the recycling channels of the end-of-life products • Users of Zn and Zn-compounds have to minimize Zn-containing waste, promote recycling routes and, for the remaining, dispose the waste streams according the Waste regulation.
<p>Conditions and measures related to external recovery of waste:</p> <p>All residues are recycled or handled and conveyed according to waste legislation.</p>
<p>Contributing scenario (2) controlling worker exposure</p>
<p>Product characteristic: see sections 3 (composition) & 9 (phys-chem properties) of SDS</p>
<p>Amounts used:</p> <ul style="list-style-type: none"> • maximum 5 T/y (industrial scale) • maximum 0.5 T/y (professional scale)
<p>Frequency and duration of use/exposure:</p> <p>Use is usually intermittent but continuous use is assumed as a worst case</p>
<p>Human factors not influenced by risk management: Uncovered body parts, (potentially) face can be exposed due to nature of activity</p>
<p>Other given operational conditions affecting workers exposure:</p> <ul style="list-style-type: none"> • high temperature steps can occur in protected zones (fume cupboards); • all indoor processes in confined area, including hazardous substances cabinets.
<p>Technical conditions and measures at process level (source) to prevent release:</p> <p>see section 8.2.1. of SDS for general measures</p>
<p>Technical conditions and measures to control dispersion from source towards the worker:</p> <p>See section 8.2.1 of SDS for general measures</p> <p>Local exhaust ventilation systems are provided where needed on the benches and in the fume cupboards.</p>
<p>Organisational measures to prevent /limit releases, dispersion and exposure: see section 8.2.1 of SDS</p>
<p>Conditions and measures related to personal protection, hygiene and health evaluation: see section 8.2.2 of SDS</p>

Exposure estimation and reference to its source: not relevant, refer to CSR.

Risks for workers and to the environment have to be assessed considering the PNECs and DNELs mentioned under SDS sections 8.1.4.

Guidance to DU to evaluate whether he works inside the boundaries set by the (G)ES.

Occupational exposure/environmental emissions

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). Environmental and human exposure can be measured or modelled (more information on tools available in SDS section 8.1.4.).

In addition, bioavailability corrections can be integrated in the exposure assessment, if the environmental parameters that are needed for the calculations are documented (see SDS section 8.1.4.)

GES ZnO-4: Industrial use of ZnO or ZnO-formulations as component for the manufacture of solid blends and matrices for further downstream use.
SU: 1, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 16, 20, 0 (Nace C20.1.2., C20.2, C20.5.1., C23.1.1., C23.2) PROC: 1, 2, 3, 4, 5, 6, 8b, 9, 13, 14, 15, 22, 24, 26 PC: 1, 5, 7, 9a, 9b, 9c, 11, 14, 15, 17, 18, 19, 20, 21, 29, 37, (ucnF05990, E070000, 30200) AC: 2, 3, 4, 7, TARIC 6813.18, 854121) ERC: 1, 2, 3, 4, 5, 6a, 6b, 7, 8a, 8b, 8d, 10a, 10b, 11a
ZnO or ZnO-containing preparations are used in the manufacture of dry preparations by mixing thoroughly the starting materials, possibly followed by pressing or pelletizing, and finally packaging of the preparation. The ZnO (/Zn compound) containing preparation/mixture can be either <ul style="list-style-type: none"> • Pressed at high temperature (>1000°C), grinded and re-pressed/sintered or fritted at high temperature • Molten at high temperature (>500°C) and further cast as glassy material • Pressed and pelletized at low temperature And subsequently packed, or used as such, in further treatment/use
Contributing scenario (1) controlling environmental exposure
Product characteristics: see sections 3 (composition) & 9 (phys-chem properties) of SDS
Amounts used: maximum 5000 T/y
Frequency and duration of use: Continuous production is assumed as a worst case
Environment factors not influenced by risk management: Flow rate of receiving surface water default for generic scenario: 18,000 m ³ /d, unless specified otherwise
Other given operational conditions affecting environmental exposure <ul style="list-style-type: none"> • All dry processes throughout, no process waters. Even when no process waters occur (with dry process throughout), some non-process water can be generated containing zinc (e.g. from cleaning) • High temperature steps are possible. • All processes are performed indoor in a confined area. High temperature steps are possible. All residues containing zinc are recycled.
Technical conditions and measures at process level (source) to prevent release: see section 8.2.3 of SDS
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil See section 8.2.3 of SDS for general measures No process waters, so possible emissions to water are limited and non-process related.
Organizational measures to prevent/limit release from site: see section 8.2.3. of SDS

Conditions and measures related to municipal sewage treatment plant: In cases where applicable: default size STP (2000 m ³ /d), unless specified otherwise.
Conditions and measures related to external treatment of waste for disposal <ul style="list-style-type: none"> • If any, all hazardous wastes are treated by certified contractors according to EU and national legislation. • Users of Zn and Zn-compounds have to favour the recycling channels of the end-of-life products • Users of Zn and Zn-compounds have to minimize Zn-containing waste, promote recycling routes and, for the remaining, dispose the waste streams according to the Waste regulation.
Conditions and measures related to external recovery of waste <ul style="list-style-type: none"> • All residues are recycled or handled and conveyed according to waste legislation. • Users of Zn and Zn-compounds have to favour the recycling channels of the end-of-life products • Users of Zn and Zn-compounds have to minimize Zn-containing waste, promote recycling routes and, for the remaining, dispose the waste streams according to the Waste regulation.
Contributing scenario (2) controlling worker exposure
Product characteristic: see sections 3 (composition) & 9 (phys-chem properties) of SDS <ul style="list-style-type: none"> • Concentration of ZnO in the mixtures can be up to >25% but is usually of the order of ≤ 5%, depending on the application • The preparation is in the solid state, usually with a low level of dustiness; however, powder forms can occur, the high dustiness is therefore applied as a worst case
Amounts used: Max 5000T/y = 15T/d = 5T/shift depending on the application.
Frequency and duration of use/exposure: 8 hour shifts (default worst case) are assumed as starting point
Human factors not influenced by risk management Uncovered body parts, (potentially) face can be exposed due to nature of activity
Other given operational conditions affecting workers exposure <ul style="list-style-type: none"> • Dry processes: dry operational conditions throughout the process; no process waters; • high temperature steps can occur; • indoor processes in confined area.
Technical conditions and measures at process level (source) to prevent release: see section 8.2.1 of SDS
Technical conditions and measures to control dispersion from source towards the worker: see section 8.2.1 of SDS
Organisational measures to prevent /limit releases, dispersion and exposure: see section 8.2.1 of SDS
Conditions and measures related to personal protection, hygiene and health evaluation: see section 8.2.2 of SDS (personal protection)

Exposure estimation and reference to its source: not relevant, refer to CSR.

Risks for workers and to the environment have to be assessed considering the PNECs and DNELs mentioned under SDS sections 8.1.4.

Guidance to DU to evaluate whether he works inside the boundaries set by the (G)ES.

Occupational exposure/environmental emissions

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). Environmental and human exposure can be measured or modelled (more information on tools available in SDS section 8.1.4.).

In addition, bioavailability corrections can be integrated in the exposure assessment, if the environmental parameters that are needed for the calculations are documented (see SDS section 8.1.4.)

GES ZnO-5: Industrial use of ZnO or ZnO-formulations as component for the manufacture of dispersions, pastes or other viscous or polymerized matrices.

SU: 1, 3, 4, 5, 6b, 7, 8, 9, 10, 11, 12, 16, 18, 20,0 (Nace C20.2. C27.2)

PROC:1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 12, 13, 14,19, 20, 21, 22, 24, 26

PC: 1, 2, 4, 7, 8, 9a, 9b, 12, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 28, 29, 31, 32, 33, 34, 35,37, 39, 40

AC: 1, 2,3,7, 10, 11, 13

ERC: 1, 2, 3, 4, 5, 6a, 6b, 6d, 7, 8a, 8b, 8c, 8d, 8f, 10a, 10b, 11a

In the described process, the zinc oxide containing preparation/mixture is:

- Unpacked and stored in silos
- Extracted from the silo, dosed and fed with the other reagents and/or solvents to the mixing tank, batch-wise or continuously, according the process receipt.
- The resulting zinc salt containing mixture (solution, dispersion, paste) is directly further processed, or packed, for further treatment/use.

Contributing scenario (1) controlling environmental exposure

Product characteristics: see sections 3 (composition) & 9 (phys-chem properties) of SDS

ZnO in preparation can be > 25%, usually <5%

Amounts used: maximum 5000 T/y

Frequency and duration of use: Continuous production is assumed as a worst case.

Environment factors not influenced by risk management: Flow rate of receiving surface water default: 18,000 m³/d, unless specified otherwise

Other given operational conditions affecting environmental exposure

- Even when no process waters occur, some non-process water can be generated containing zinc (e.g. from cleaning)
- All processes are performed indoor in a confined area.
- All residues containing zinc are recycled.

Technical conditions and measures at process level (source) to prevent release: see section 8.2.3. of SDS

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil: see section 8.2.3. of SDS

Organizational measures to prevent/limit release from site: see section 8.2.3 of SDS

Conditions and measures related to municipal sewage treatment plant

In cases where applicable: default size of municipal STP (2000m³/d), unless specified otherwise.

Conditions and measures related to external treatment of waste for disposal

- If any, all hazardous wastes are treated by certified contractors according to EU and national legislation.
- Users of Zn and Zn-compounds have to favour the recycling channels of the end-of-life products
- Users of Zn and Zn-compounds have to minimize Zn-containing waste, promote recycling routes and, for the remaining, dispose the waste streams according the Waste regulation.

Conditions and measures related to external recovery of waste

- All residues are recycled or handled and conveyed according to waste legislation.
- Users of Zn and Zn-compounds have to favour the recycling channels of the end-of-life products
- Users of Zn and Zn-compounds have to minimize Zn-containing waste, promote recycling routes and, for the remaining, dispose the waste streams according the Waste regulation.

Contributing scenario (2) controlling worker exposure

Product characteristic: see sections 3 (composition) & 9 (phys-chem properties) of SDS

- The concentration of ZnO in the mixtures can be up to >25% but is usually of the order of <= 5%, depending on the application.
- The preparation is in the liquid state, as a paste or dispersion or other viscous or polymerized matrix, with a low level of dustiness; however, powder forms can occur, medium dustiness is therefore

applied as a worst case
Amounts used: Max 5000T/y = 20 T/d = 7T/shift depending on the application.
Frequency and duration of use/exposure: 8 hour shifts (default worst case) are assumed as starting point
Human factors not influenced by risk management
Uncovered body parts (potentially) face can be exposed as a result of the nature of the activity
Other given operational conditions affecting workers exposure
<ul style="list-style-type: none"> • Wet processes • All indoor processes in confined area.
Technical conditions and measures at process level (source) to prevent release: see section 8.2.1
Technical conditions and measures to control dispersion from source towards the worker: see section 8.2.1 LEV in work area: efficiency 84% (generic LEV)
Organisational measures to prevent /limit releases, dispersion and exposure: see section 8.2.1.
Conditions and measures related to personal protection, hygiene and health evaluation: see section 8.2.2. In particular, when PROC 7, 11, 19 are involved, respiratory protection is recommended

Exposure estimation and reference to its source: not relevant, refer to CSR.

Risks for workers and to the environment have to be assessed considering the PNECs and DNELs mentioned under SDS sections 8.1.4.

Guidance to DU to evaluate whether he works inside the boundaries set by the (G)ES.

Occupational exposure/environmental emissions

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). Environmental and human exposure can be measured or modelled (more information on tools available in SDS section 8.1.4.).

In addition, bioavailability corrections can be integrated in the exposure assessment, if the environmental parameters that are needed for the calculations are documented (see SDS section 8.1.4.)

GES ZnO-6: Industrial and professional use of solid substrates containing less than 25%w/w of ZnO.
SU: 0 (Nace C23.1., C23.4., F43.3.4.), 3, 5, 6b, 9, 10, 13, 16, 17,20, 22 PROC: 4, 5 ,6, 7, 8b, 9,10, 11, 13, 14, 19, 21, 22, 26 PC: 1, 8, 9a, 9b, 9c,14,15, 18, 19, 20, 21, 23, 28, 29, 33, 34, 35, 39, 0(UCN F40000, G15000) AC: 1, 2, 4, (Taric 6813.81, 6911), 0 (coatings for art and creative items) ERC: 2, 4, 5, 8a, 8d, 10a, 10b, 11a, 12a
This scenario covers both the industrial scale processes and professional use. In the described process, the ZnO containing preparation/mixture is further processed, involving potentially the following steps: <ul style="list-style-type: none"> • reception/unpacking of material • Final application, embedding, or shaping to produce the end product or article.
Contributing scenario (1) controlling environmental exposure
Product characteristics: see sections 3 (composition) & 9 (phys-chem properties) of SDS ZnO (or Zn compound) in the article is < 25%
Amounts used: Typical quantities for both Industrial and professional are 50T/y (typical), maximum 500T/y (in industrial setting).
Frequency and duration of use: Continuous production is assumed as a worst case.
Environment factors not influenced by risk management: Flow rate of receiving surface water default: 18,000 m3/d, unless specified otherwise

<p>Other given operational conditions affecting environmental exposure</p> <ul style="list-style-type: none"> • Solid, so in principle all dry processes throughout, no process waters. Even when no process waters occur (with dry process throughout), some non-process water can be generated containing zinc (e.g. from cleaning) • In industrial and professional setting, all processes are performed indoor in a confined area. All residues containing zinc are recycled.
<p>Technical conditions and measures at process level (source) to prevent release: See section 8.2.3</p>
<p>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</p> <p>In industrial and professional setting, the following applies:</p> <ul style="list-style-type: none"> • No process waters, so possible emissions to water are limited and non-process related. • By exposure modeling it is predicted that at use quantities of >100T/y, refinement of the exposure assessment to water and sediment needs to be made (exposure assessment based on real measured data and local parameters). Treatment of the emissions to water may be needed under such conditions. • See section 8.2.3 of SDS for air and water emissions abatement systems
<p>Organizational measures to prevent/limit release from site: see section 8.2.3. of SDS</p>
<p>Conditions and measures related to municipal sewage treatment plant</p> <p>In cases where applicable: default size of the municipal STP (2000 m³/d), unless specified otherwise.</p>
<p>Conditions and measures related to external treatment of waste for disposal</p> <ul style="list-style-type: none"> • If any, all hazardous wastes are treated by certified contractors according to EU and national legislation. • Users of Zn and Zn-compounds have to favour the recycling channels of the end-of-life products • Users of Zn and Zn-compounds have to minimize Zn-containing waste, promote recycling routes and, for the remaining, dispose the waste streams according the Waste regulation.
<p>Conditions and measures related to external recovery of waste: All residues are recycled or handled and conveyed according to the waste legislation.</p>
<p>Contributing scenario (2) controlling worker exposure</p>
<p>Product characteristic: see sections 3 (composition) & 9 (phys-chem properties) of SDS</p> <ul style="list-style-type: none"> • The concentration of ZnO (or Zn compound) in the mixture is < 25% • The mixture is in the solid state, with a low level of dustiness; however, powder forms can occur, the medium dustiness is therefore applied as a worst case.
<p>Amounts used</p> <ul style="list-style-type: none"> • Typical quantities for both Industrial and professional are 50 T/y (typical), or 0.15 T/day, 0.05 T/shift • Maximum use quantity is 500T/y (1.5T/d, 0.5T/shift) in industrial setting.
<p>Frequency and duration of use/exposure: 8 hour shifts (default worst case) are assumed as starting point</p>
<p>Human factors not influenced by risk management: Uncovered body parts (potentially) face can be exposed as a result of the nature of the activity</p>
<p>Other given operational conditions affecting workers exposure</p> <p>Industrial / Professional:</p> <ul style="list-style-type: none"> • Dry processes: dry operational conditions throughout the process, no process waters; • Indoor processes in confined area.
<p>Technical conditions and measures at process level (source) to prevent release</p> <p>Industrial /professional see section 8.2.3. of SDS</p>
<p>Technical conditions and measures to control dispersion from source towards the worker</p> <p>Industrial /professional: LEV in work area: efficiency 84% (generic LEV)</p> <p>See section 8.2.3. for more specific abatement systems</p>
<p>Organisational measures to prevent /limit releases, dispersion and exposure:</p> <p>see section 8.2.1 of SDS</p>

Conditions and measures related to personal protection, hygiene and health evaluation: see section 8.2.2. of SDS

Exposure estimation and reference to its source: not relevant, refer to CSR.

Risks for workers and to the environment have to be assessed considering the PNECs and DNELs mentioned under SDS sections 8.1.4.

Guidance to DU to evaluate whether he works inside the boundaries set by the (G)ES.

Occupational exposure/environmental emissions

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). Environmental and human exposure can be measured or modelled (more information on tools available in SDS section 8.1.4.).

In addition, bioavailability corrections can be integrated in the exposure assessment, if the environmental parameters that are needed for the calculations are documented (see SDS section 8.1.4.)

GES ZnO-7: Industrial and professional use of dispersions, pastes and polymerised substrates containing less than 25%w/w of ZnO.

SU: 1, 3, 4, 5, 6, 9, 10, 11, 12, 13, 15, 17, 18, 19, 20, 22, 0 (Nace C22.1.1.)

PROC: 1, 4, 5, 7, 8a, 8b, 9, 10, 11, 13, 14, 15, 17, 19, 21, 24

PC: 1, 4, 8, 9a, 9b, 9c, 14,, 15, 18, 19, 20, 21, 24, 25, 28, 29, 31, 32, 33, 35, 39

AC: 1, 2, 3, 5, 7, 10, 13, 0 (coatings for art and creative items)

ERC: 5, 6d, 8a, 8c, 8d, 8f, 10a, 10b, 11a, 12a

This scenario covers both the industrial scale processes and professional use. In the described process, the ZnO containing preparation/mixture is further processed, involving potentially the following steps:

- Reception/unpacking of material
- Final application, spraying, embedding or to produce the end product or article.

Contributing scenario (1) controlling environmental exposure

Product characteristics: see sections 3 (composition) & 9 (phys-chem properties) of SDS

ZnO (or Zn compound) in the article is < 25%

Amounts used: Typical quantities for both industrial and professional are 50T/y (typical), maximum 500T/y (in industrial setting).

Frequency and duration of use: Continuous production is assumed as a worst case

Environment factors not influenced by risk management: Flow rate of receiving surface water default: 18,000 m³/d, unless specified otherwise

Other given operational conditions affecting environmental exposure

- Wet processes. All process and non-process waters should be recycled internally to a maximal extent. Even when no process waters occur, some non-process water can be generated containing zinc (e.g. from cleaning)
- In industrial and professional setting, all processes are performed in a confined area. All residues containing zinc are recycled.

Technical conditions and measures at process level (source) to prevent release: see section 8.2.3

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

See section 8.2.3 of SDS

By exposure modeling it is predicted that at use quantities of >100T/y, refinement of the exposure assessment to water and sediment needs to be made (exposure assessment based on real measured data and local parameters). Treatment of the emissions to water may be needed under such conditions.
Organizational measures to prevent/limit release from site: see section 8.2.3. of SDS
Conditions and measures related to municipal sewage treatment plant: In cases where applicable, default size of the municipal STP (2000 m ³ /d), unless specified otherwise.
Conditions and measures related to external treatment of waste for disposal <ul style="list-style-type: none"> • If any, all hazardous wastes are treated by certified contractors according to EU and national legislation. • Users of Zn and Zn-compounds have to favour the recycling channels of the end-of-life products • Users of Zn and Zn-compounds have to minimize Zn-containing waste, promote recycling routes and, for the remaining, dispose the waste streams according the Waste regulation.
Conditions and measures related to external recovery of waste All residues are recycled or handled and conveyed according to waste legislation.
Contributing scenario (2) controlling worker exposure
Product characteristic: see sections 3 (composition) & 9 (phys-chem properties) of SDS <ul style="list-style-type: none"> • Particles can occur sporadically, the low level of dustiness is basically applied. • Most of the processes imply the use of solutions or pastes; the “solution status” is therefore taken as the worst case.
Amounts used <ul style="list-style-type: none"> • Typical quantities for both Industrial and professional are 50 T/y (typical), or 0.15 T/day, 0.05 T/shift. • Maximum use quantity is 500T/y (1.5T/d, 0.5T/shift) in industrial setting.
Frequency and duration of use/exposure: 8 hour shifts (default worst case) are assumed as starting point
Human factors not influenced by risk management Uncovered body parts, (potentially) face exposed as a result of the nature of the activity
Other given operational conditions affecting workers exposure Industrial / Professional: Wet processes, all indoor in confined area.
Technical conditions and measures at process level (source) to prevent release: see section 8.2.1.
Technical conditions and measures to control dispersion from source towards the worker
Industrial /professional: LEV in work area: efficiency 84% (generic LEV). See section 8.2.1 of SDS
Organisational measures to prevent /limit releases, dispersion and exposure: see section 8.2.1 of SDS
Conditions and measures related to personal protection, hygiene and health evaluation: see section 8.2.2 of SDS