

FICHA DE DATOS DE SEGURIDAD

(de acuerdo con el Reglamento (UE) 2015/830)

257A3T-ÓXIDO DE ZINC SELLO ORO

Versión: 9

Fecha de revisión: 06/04/2019

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Fecha de impresión: 04/06/2019

SECCIÓN 1: IDENTIFICACIÓN DE LA SUSTANCIA Y DE LA SOCIEDAD O LA EMPRESA.

1.1 Identificador del producto.

Nombre del producto: OXIDO DE ZINC SELLO ORO
Código del producto: 257A3T
Nombre químico: óxido de cinc
N. Índice: 030-013-00-7
N. CAS: 1314-13-2
N. CE: 215-222-5
N. registro: 01-2119463881-32-XXXX

1.2 Usos pertinentes identificados de la sustancia y usos desaconsejados.

Genérico industrial

Usos desaconsejados:

Usos distintos a los aconsejados.

1.3 Datos del proveedor de la ficha de datos de seguridad.

Empresa: **Barcelonesa de Drogas y Productos Químicos, S.A.**
Dirección: Crom, 14 - P.I. FAMADES
Población: 08940 - Cornellà del Llobregat
Provincia: Barcelona
Teléfono: 93 377 02 08
Fax: 93 377 42 49
E-mail: barcelonesa@barcelonesa.com
Web: www.grupbarcelonesa.com

1.4 Teléfono de emergencia: 704100087 (Disponible 24h)

SECCIÓN 2: IDENTIFICACIÓN DE LOS PELIGROS.

2.1 Clasificación de la sustancia.

Según el Reglamento (EU) No 1272/2008:

Aquatic Chronic 1 : Muy tóxico para los organismos acuáticos, con efectos nocivos duraderos.

2.2 Elementos de la etiqueta.

Etiquetado conforme al Reglamento (EU) No 1272/2008:

Pictogramas:



Palabra de advertencia:

Atención

Frases H:

H410 Muy tóxico para los organismos acuáticos, con efectos nocivos duraderos.

Frases P:

P273 Evitar su liberación al medio ambiente.

P391 Recoger el vertido.

P501 Eliminar el contenido/el recipiente en un tratador autorizado de residuos.

Contiene:

óxido de cinc

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2.3 Otros peligros.

En condiciones de uso normal y en su forma original, el producto no tiene ningún otro efecto negativo para la salud y el medio ambiente.

SECCIÓN 3: COMPOSICIÓN/INFORMACIÓN SOBRE LOS COMPONENTES.

3.1 Sustancias.

Nombre químico:	[1] óxido de cinc
N. Índice:	030-013-00-7
N. CAS:	1314-13-2
N. CE:	215-222-5
N. registro:	01-2119463881-32-XXXX

[1] Sustancia a la que se aplica un límite comunitario de exposición en el lugar de trabajo (ver sección 8.1).

3.2 Mezclas.

No Aplicable.

SECCIÓN 4: PRIMEROS AUXILIOS.

4.1 Descripción de los primeros auxilios.

En los casos de duda, o cuando persistan los síntomas de malestar, solicitar atención médica. No administrar nunca nada por vía oral a personas que se encuentre inconscientes.

Inhalación.

Situar al accidentado al aire libre, mantenerle caliente y en reposo, si la respiración es irregular o se detiene, practicar respiración artificial.

Contacto con los ojos.

Retirar las lentes de contacto, si lleva y resulta fácil de hacer. Lavar abundantemente los ojos con agua limpia y fresca durante, por lo menos, 10 minutos, tirando hacia arriba de los párpados y buscar asistencia médica.

Contacto con la piel.

Quitar la ropa contaminada. Lavar la piel vigorosamente con agua y jabón o un limpiador de piel adecuado. NUNCA utilizar disolventes o diluyentes.

Ingestión.

Si accidentalmente se ha ingerido, buscar inmediatamente atención médica. Mantenerle en reposo. NUNCA provocar el vómito.

4.2 Principales síntomas y efectos, agudos y retardados.

No se conocen efectos agudos o retardados derivados de la exposición al producto.

4.3 Indicación de toda atención médica y de los tratamientos especiales que deban dispensarse inmediatamente.

En los casos de duda, o cuando persistan los síntomas de malestar, solicitar atención médica. No administrar nunca nada por vía oral a personas que se encuentren inconscientes.

SECCIÓN 5: MEDIDAS DE LUCHA CONTRA INCENDIOS.

El producto no presenta ningún riesgo particular en caso de incendio.

5.1 Medios de extinción.

Medios de extinción apropiados:

Polvo extintor o CO2. En caso de incendios más graves también espuma resistente al alcohol y agua pulverizada.

Medios de extinción no apropiados:

No usar para la extinción chorro directo de agua. En presencia de tensión eléctrica no es aceptable utilizar agua o espuma como medio de extinción.

5.2 Peligros específicos derivados de la sustancia.

Riesgos especiales.

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El fuego puede producir un espeso humo negro. Como consecuencia de la descomposición térmica, pueden formarse productos peligrosos: monóxido de carbono, dióxido de carbono. La exposición a los productos de combustión o descomposición puede ser perjudicial para la salud.

5.3 Recomendaciones para el personal de lucha contra incendios.

Refrigerar con agua los tanques, cisternas o recipientes próximos a la fuente de calor o fuego. Tener en cuenta la dirección del viento. Evitar que los productos utilizados en la lucha contra incendio pasen a desagües, alcantarillas o cursos de agua. Los restos de producto y medios de extinción pueden contaminar el medio ambiente acuático.

Equipo de protección contra incendios.

Según la magnitud del incendio, puede ser necesario el uso de trajes de protección contra el calor, equipo respiratorio autónomo, guantes, gafas protectoras o máscaras faciales y botas.

SECCIÓN 6: MEDIDAS EN CASO DE VERTIDO ACCIDENTAL.

6.1 Precauciones personales, equipo de protección y procedimientos de emergencia.

Para control de exposición y medidas de protección individual, ver sección 8.

6.2 Precauciones relativas al medio ambiente.

Producto peligroso para el medio ambiente, en caso de producirse grandes vertidos o si el producto contamina lagos, ríos o alcantarillas, informar a las autoridades competentes, según la legislación local. Evitar la contaminación de desagües, aguas superficiales o subterráneas, así como del suelo.

6.3 Métodos y material de contención y de limpieza.

La zona contaminada debe limpiarse inmediatamente con un descontaminante adecuado. Echar el descontaminante a los restos y dejarlo durante varios días hasta que no se produzca reacción, en un envase sin cerrar.

6.4 Referencia a otras secciones.

Para control de exposición y medidas de protección individual, ver sección 8.
Para la eliminación de los residuos, seguir las recomendaciones de la sección 13.

SECCIÓN 7: MANIPULACIÓN Y ALMACENAMIENTO.

7.1 Precauciones para una manipulación segura.

Para la protección personal, ver sección 8. No emplear nunca presión para vaciar los envases, no son recipientes resistentes a la presión.

En la zona de aplicación debe estar prohibido fumar, comer y beber.

Cumplir con la legislación sobre seguridad e higiene en el trabajo.

Conservar el producto en envases de un material idéntico al original.

7.2 Condiciones de almacenamiento seguro, incluidas posibles incompatibilidades.

Almacenar según la legislación local. Observar las indicaciones de la etiqueta. Almacenar los envases entre 5 y 35 °C, en un lugar seco y bien ventilado, lejos de fuentes de calor y de la luz solar directa. Mantener lejos de puntos de ignición. Mantener lejos de agentes oxidantes y de materiales fuertemente ácidos o alcalinos. No fumar. Evitar la entrada a personas no autorizadas. Una vez abiertos los envases, han de volverse a cerrar cuidadosamente y colocarlos verticalmente para evitar derrames.

Clasificación y cantidad umbral de almacenaje de acuerdo con el Anexo I de la Directiva 2012/18/UE (SEVESO III):

Código	Descripción	Cantidad umbral (toneladas) a efectos de aplicación de los	
		requisitos de nivel inferior	requisitos de nivel superior
E1	PELIGROS PARA EL MEDIOAMBIENTE - Peligroso para el medio ambiente acuático en las categorías aguda 1 o crónica 1	100	200

7.3 Usos específicos finales.

No disponible.

SECCIÓN 8: CONTROLES DE EXPOSICIÓN/PROTECCIÓN INDIVIDUAL.

8.1 Parámetros de control.

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Límite de exposición durante el trabajo para:

Nombre	N. CAS	País	Valor límite	ppm	mg/m ³
óxido de cinc	1314-13-2	España [1]	Ocho horas		2 (Fracción respirable)
			Corto plazo		10 (Fracción respirable)

[1] Según la lista de Valores Límite Ambientales de Exposición Profesional adoptados por el Instituto Nacional de Seguridad e Higiene en el Trabajo (INSHT) para el año 2017.

El producto NO contiene sustancias con Valores Límite Biológicos.

Niveles de concentración DNEL/DMEL:

Nombre	DNEL/DMEL	Tipo	Valor
óxido de cinc N. CAS: 1314-13-2 N. CE: 215-222-5	DNEL (Trabajadores)	Inhalación, Crónico, Efectos sistémicos	5 (mg/m ³)

DNEL: Derived No Effect Level, (nivel sin efecto obtenido) nivel de exposición a la sustancia por debajo del cual no se prevén efectos adversos.

DMEL: Derived Minimal Effect Level, nivel de exposición que corresponde a un riesgo bajo, que debe considerarse un riesgo mínimo tolerable.

8.2 Controles de la exposición.

Medidas de orden técnico:

Proveer una ventilación adecuada, lo cual puede conseguirse mediante una buena extracción-ventilación local y un buen sistema general de extracción.

Concentración:	100 %		
Usos:	Genérico industrial		
Protección respiratoria:			
EPI:	Mascarilla autofiltrante para partículas		
Características:	Marcado «CE» Categoría III. Fabricada en material filtrante, cubre nariz, boca y mentón.		
Normas CEN:	EN 149		
Mantenimiento:	Previo al uso se comprobará la ausencia de roturas, deformaciones, etc. Por ser un equipo de protección individual desechable, se deberá renovar en cada uso.		
Observaciones:	Si no están bien ajustado no protege al trabajador. Se deberán seguir las instrucciones del fabricante respecto al uso apropiado del equipo.		
Tipo de filtro necesario:	P2		
Protección de las manos:			
EPI:	Guantes de trabajo		
Características:	Marcado «CE» Categoría I.		
Normas CEN:	EN 374-1, EN 374-2, EN 374-3, EN 420		
Mantenimiento:	Se guardarán en un lugar seco, alejados de posibles fuentes de calor, y se evitará la exposición a los rayos solares en la medida de lo posible. No se realizarán sobre los guantes modificaciones que puedan alterar su resistencia ni se aplicarán pinturas, disolventes o adhesivos.		
Observaciones:	Los guantes deben ser de la talla correcta, y ajustarse a la mano sin quedar demasiado holgados ni demasiado apretados. Se deberán utilizar siempre con las manos limpias y secas.		
Material:	PVC (Cloruro de polivinilo)	Tiempo de penetración (min.):	> 480
		Espesor del material (mm):	0,35
Protección de los ojos:			
EPI:	Gafas de protección contra impactos de partículas		
Características:	Marcado «CE» Categoría II. Protector de ojos contra polvo y humos.		
Normas CEN:	EN 165, EN 166, EN 167, EN 168		
Mantenimiento:	La visibilidad a través de los oculares debe ser óptima para lo cual estos elementos se deben limpiar a diario, los protectores deben desinfectarse periódicamente siguiendo las instrucciones del fabricante.		
Observaciones:	Indicadores de deterioro pueden ser: coloración amarilla de los oculares, arañazos superficiales en los oculares, rasgaduras, etc.		
Protección de la piel:			
EPI:	Calzado de trabajo		
Características:	Marcado «CE» Categoría II.		

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Normas CEN:	EN ISO 13287, EN 20347
Mantenimiento:	Estos artículos se adaptan a la forma del pie del primer usuario. Por este motivo, al igual que por cuestiones de higiene, debe evitarse su reutilización por otra persona.
Observaciones:	El calzado de trabajo para uso profesional es el que incorpora elementos de protección destinados a proteger al usuario de las lesiones que pudieran provocar los accidentes, se debe revisar los trabajos para los cuales es apto este calzado.

SECCIÓN 9: PROPIEDADES FÍSICAS Y QUÍMICAS.

9.1 Información sobre propiedades físicas y químicas básicas.

Aspecto: Sólido blanco o amarillento

Color: N.D./N.A.

Olor: Inodoro

Umbral olfativo: N.D./N.A.

pH: No aplicable

Punto de Fusión: No funde °C

Punto/intervalo de ebullición: N.D./N.A.

Punto de inflamación: N.D./N.A.

Tasa de evaporación: N.D./N.A.

Inflamabilidad (sólido, gas): No inflamable

Límite inferior de explosión: N.D./N.A.

Límite superior de explosión: N.D./N.A.

Presión de vapor: N.D./N.A.

Densidad de vapor: No se dispone de valor

Densidad relativa: 5.607 g/cm³

Solubilidad: N.D./N.A.

Liposolubilidad: N.D./N.A.

Hidrosolubilidad: Prácticamente insoluble en agua

Coefficiente de reparto (n-octanol/agua): N.D./N.A.

Temperatura de autoinflamación: N.D./N.A.

Temperatura de descomposición: N.D./N.A.

Viscosidad: N.D./N.A.

Propiedades explosivas: N.D./N.A.

Propiedades comburentes: No oxidante

N.D./N.A.= No Disponible/No Aplicable debido a la naturaleza del producto.

9.2 Otros datos.

Punto de Gota: N.D./N.A.

Centelleo: N.D./N.A.

Viscosidad cinemática: N.D./N.A.

N.D./N.A.= No Disponible/No Aplicable debido a la naturaleza del producto.

SECCIÓN 10: ESTABILIDAD Y REACTIVIDAD.

10.1 Reactividad.

El producto no presenta peligros debido a su reactividad.

10.2 Estabilidad química.

Estable bajo las condiciones de manipulación y almacenamiento recomendadas (ver epígrafe 7).

10.3 Posibilidad de reacciones peligrosas.

El producto no presenta posibilidad de reacciones peligrosas.

10.4 Condiciones que deben evitarse.

Evitar cualquier tipo de manipulación incorrecta.

10.5 Materiales incompatibles.

Mantener alejado de agentes oxidantes y de materiales fuertemente alcalinos o ácidos, a fin de evitar reacciones exotérmicas.

10.6 Productos de descomposición peligrosos.

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No se descompone si se destina a los usos previstos.

SECCIÓN 11: INFORMACIÓN TOXICOLÓGICA.

11.1 Información sobre los efectos toxicológicos.

El contacto repetido o prolongado con el producto, puede causar la eliminación de la grasa de la piel, dando lugar a una dermatitis de contacto no alérgica y a que se absorba el producto a través de la piel.

Las salpicaduras en los ojos pueden causar irritación y daños reversibles.

Información Toxicológica.

Nombre	Toxicidad aguda			
	Tipo	Ensayo	Especie	Valor
óxido de cinc N. CAS: 1314-13-2 N. CE: 215-222-5	Oral	LD50	Rata	>5000 mg/kg
	Cutánea			
	Inhalación	LC50	Rata	>5.7 mg/L (4h)

a) toxicidad aguda;

Datos no concluyentes para la clasificación.

b) corrosión o irritación cutáneas;

Datos no concluyentes para la clasificación.

c) lesiones oculares graves o irritación ocular;

Datos no concluyentes para la clasificación.

d) sensibilización respiratoria o cutánea;

Datos no concluyentes para la clasificación.

e) mutagenicidad en células germinales;

Datos no concluyentes para la clasificación.

f) carcinogenicidad;

Datos no concluyentes para la clasificación.

g) toxicidad para la reproducción;

Datos no concluyentes para la clasificación.

h) toxicidad específica en determinados órganos (STOT) - exposición única;

Datos no concluyentes para la clasificación.

i) toxicidad específica en determinados órganos (STOT) - exposición repetida;

Datos no concluyentes para la clasificación.

j) peligro por aspiración;

Datos no concluyentes para la clasificación.

SECCIÓN 12: INFORMACIÓN ECOLÓGICA.

12.1 Toxicidad.

Nombre	Ecotoxicidad			
	Tipo	Ensayo	Especie	Valor
óxido de cinc	Peces			
	Invertebrados acuáticos	LE50	Dafnia magna	0.07 mg/l zinc (48h)
	Plantas			

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12.2 Persistencia y degradabilidad.

No se dispone de información relativa a la biodegradabilidad.
No se dispone de información relativa a la degradabilidad.
No existe información disponible sobre la persistencia y degradabilidad del producto.

12.3 Potencial de Bioacumulación.

No se dispone de información relativa a la Bioacumulación.

12.4 Movilidad en el suelo.

No existe información disponible sobre la movilidad en el suelo.
No se debe permitir que el producto pase a las alcantarillas o a cursos de agua.
Evitar la penetración en el terreno.

12.5 Resultados de la valoración PBT y mPmB.

No existe información disponible sobre la valoración PBT y mPmB del producto.

12.6 Otros efectos adversos.

No existe información disponible sobre otros efectos adversos para el medio ambiente.

SECCIÓN 13: CONSIDERACIONES RELATIVAS A LA ELIMINACIÓN.

13.1 Métodos para el tratamiento de residuos.

No se permite su vertido en alcantarillas o cursos de agua. Los residuos y envases vacíos deben manipularse y eliminarse de acuerdo con las legislaciones local/nacional vigentes.
Seguir las disposiciones de la Directiva 2008/98/CE respecto a la gestión de residuos.

SECCIÓN 14: INFORMACIÓN RELATIVA AL TRANSPORTE.

Transportar siguiendo las normas ADR/TPC para el transporte por carretera, las RID por ferrocarril, las IMDG por mar y las ICAO/IATA para transporte aéreo.

Tierra: Transporte por carretera: ADR, Transporte por ferrocarril: RID.

Documentación de transporte: Carta de porte e Instrucciones escritas.

Mar: Transporte por barco: IMDG.

Documentación de transporte: Conocimiento de embarque.

Aire: Transporte en avión: IATA/ICAO.

Documento de transporte: Conocimiento aéreo.

14.1 Número ONU.

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Nº UN: UN3077

14.2 Designación oficial de transporte de las Naciones Unidas.

Descripción:

ADR: UN 3077, SUSTANCIA SÓLIDA PELIGROSA PARA EL MEDIO AMBIENTE, N.E.P. (CONTIENE ÓXIDO DE ZINC), 9, GE III

IMDG: UN 3077, SUSTANCIA SÓLIDA PELIGROSA PARA EL MEDIO AMBIENTE, N.E.P. (CONTIENE ÓXIDO DE ZINC), 9, GE/E III, CONTAMINANTE DEL MAR

ICAO/IATA: UN 3077, SUSTANCIA SÓLIDA PELIGROSA PARA EL MEDIO AMBIENTE, N.E.P. (CONTIENE ÓXIDO DE ZINC), 9, GE III

14.3 Clase(s) de peligro para el transporte.

Clase(s): 9

14.4 Grupo de embalaje.

Grupo de embalaje: III

14.5 Peligros para el medio ambiente.

Contaminante marino: Si



Peligroso para el medio ambiente

14.6 Precauciones particulares para los usuarios.

Etiquetas: 9



Número de peligro: 90

ADR cantidad limitada: 5 kg

IMDG cantidad limitada: 5 kg

ICAO cantidad limitada: 30 kg B

Disposiciones relativas al transporte a granel en ADR:

VC1 Está autorizado el transporte a granel en vehículos entoldados, en contenedores entoldados o en contenedores para granel entoldados.

VC2 Está autorizado el transporte a granel en vehículos cubiertos, en contenedores cerrados o en contenedores para granel cerrados.

Transporte por barco, FEm - Fichas de emergencia (F – Incendio, S – Derrames): F-A,S-F

Actuar según el punto 6.

14.7 Transporte a granel con arreglo al anexo II del Convenio MARPOL y del Código IBC.

El producto no está afectado por el transporte a granel en buques.

SECCIÓN 15: INFORMACIÓN REGLAMENTARIA.

15.1 Reglamentación y legislación en materia de seguridad, salud y medio ambiente específicas para la sustancia.

El producto no está afectado por el Reglamento (CE) nº 1005/2009 del Parlamento Europeo y del Consejo, de 16 de septiembre de 2009, sobre las sustancias que agotan la capa de ozono.

Compuesto orgánico volátil (COV)

Contenido de COV (p/p): 0 %

Contenido de COV: 0 g/l

Clasificación del producto de acuerdo con el Anexo I de la Directiva 2012/18/UE (SEVESO III): E1

El producto no está afectado por el Reglamento (UE) No 528/2012 relativo a la comercialización y el uso de los biocidas.

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El producto no se encuentra afectado por el procedimiento establecido en el Reglamento (UE) No 649/2012, relativo a la exportación e importación de productos químicos peligrosos.

15.2 Evaluación de la seguridad química.

No se ha llevado a cabo una evaluación de la seguridad química del producto.

Se dispone de Escenario de Exposición del producto.

SECCIÓN 16: OTRA INFORMACIÓN.

Códigos de clasificación:

Aquatic Acute 1 : Toxicidad aguda para el medio ambiente acuático, Categoría 1

Aquatic Chronic 1 : Efectos crónicos para el medio ambiente acuático, Categoría 1

Secciones modificadas respecto a la versión anterior:

1,14,16,Escenario(s) de exposición

Se aconseja realizar formación básica con respecto a seguridad e higiene laboral para realizar una correcta manipulación del producto.

Se dispone de Escenario de Exposición del producto.

Abreviaturas y acrónimos utilizados:

ADR: Acuerdo europeo sobre el transporte internacional de mercancías peligrosas por carretera.

CEN: Comité Europeo de Normalización.

DMEL: Derived Minimal Effect Level, nivel de exposición que corresponde a un riesgo bajo, que debe considerarse un riesgo mínimo tolerable.

DNEL: Derived No Effect Level, (nivel sin efecto obtenido) nivel de exposición a la sustancia por debajo del cual no se prevén efectos adversos.

EC50: Concentración efectiva media.

EPI: Equipo de protección personal.

IATA: Asociación Internacional de Transporte Aéreo.

ICAO: Organización de Aviación Civil Internacional.

IMDG: Código Marítimo Internacional de Mercancías Peligrosas.

LC50: Concentración Letal, 50%.

LD50: Dosis Letal, 50%.

RID: Regulación concerniente al transporte internacional de mercancías peligrosas por ferrocarril.

Principales referencias bibliográficas y fuentes de datos:

<http://eur-lex.europa.eu/homepage.html>

<http://echa.europa.eu/>

Reglamento (UE) 2015/830.

Reglamento (CE) No 1907/2006.

Reglamento (EU) No 1272/2008.

La información facilitada en esta ficha de Datos de Seguridad ha sido redactada de acuerdo con el REGLAMENTO (UE) 2015/830 DE LA COMISIÓN de 28 de mayo de 2015 por el que se modifica el Reglamento (CE) no 1907/2006 del Parlamento Europeo y del Consejo, relativo al registro, la evaluación, la autorización y la restricción de las sustancias y mezclas químicas (REACH), por el que se crea la Agencia Europea de Sustancias y Preparados Químicos, se modifica la Directiva 1999/45/CE y se derogan el Reglamento (CEE) nº 793/93 del Consejo y el Reglamento (CE) nº 1488/94 de la Comisión así como la Directiva 76/769/CEE del Consejo y las Directivas 91/155/CEE, 93/67/CEE, 93/105/CE y 2000/21/CE de la Comisión.

La información de esta Ficha de Datos de Seguridad del Producto está basada en los conocimientos actuales y en las leyes vigentes de la CE y nacionales, en cuanto que las condiciones de trabajo de los usuarios están fuera de nuestro conocimiento y control. El producto no debe utilizarse para fines distintos a aquellos que se especifican, sin tener primero una instrucción por escrito, de su manejo. Es siempre responsabilidad del usuario tomar las medidas oportunas con el fin de cumplir con las exigencias establecidas en las legislaciones.

Escenarios de exposición del óxido de zinc

Introduction to (short) Generic Exposure Scenarios (GES): ZnO

For assessment of exposures at local scale, several generic exposure scenarios (GES) were developed in the chemical safety report (CSR) for each zinc substance. This was necessary because of the significant number of uses that was identified for each of the substances. 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.

Shortened GES for annexing to the e-SDS

For reasons of clarity, shortened versions of the GES as documented in the CSR have been listed below. These shortened versions focus on a) operational conditions and b) risk management measures. Repetition of information contained in the SDS has been avoided by cross-referencing.

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

Escenarios de exposición del óxido de zinc

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	Producción de óxido de cinc – Directa	GESZnO 0
2	Producción de óxido de cinc – Indirecta	GESZnO 0
3	Producción de óxido de cinc – En húmedo	GESZnO 0
9	Componente para la producción de compuestos de cinc inorgánicos	GESZnO 2
10	Electro galvanizado	GESZnO 2
11	Galvanoplastia	GESZnO 2
12	Producción de cinc por electro-obtención	GESZnO 2
13	Reactivo de laboratorio	GESZnO 3
14	Producción de cinc por pirometalurgia	GESZnO 2
15	Producción y refinado de óxido de cinc	GESZnO 0
16	Componente para la producción de compuestos de cinc orgánicos	GESZnO 2
17	Componente para la producción de pigmentos inorgánicos	GESZnO 1, GESZnO 4
18	Componente para la elaboración de recubrimientos / pinturas, tintas, vidriados, barnices	GESZnO 1, GESZnO 4
19	Uso de pinturas y recubrimientos que contienen ZnO	GESZnO 7
20	Suministro para artistas: Uso de pinturas y recubrimientos que contienen ZnO	Generic consumer/environment*
21	Componente para el recubrimiento de papel	GESZnO 1, GESZnO 5
22	Uso de recubrimientos de papel que contienen ZnO	GESZnO 6
23	Componente para el recubrimiento / tratamiento de textil y cuero	GESZnO 1, GESZnO 5
24	Uso de recubrimientos de textil y cuero que contienen ZnO	GESZnO 6
25	Aditivo / componente para la producción de cerámica	GESZnO 1, GESZnO 4
26	Aditivo / componente para la producción de fritas	GESZnO 1, GESZnO 4
27	Uso de esmaltes y de recubrimientos vítreos de película delgada que contienen ZnO	GESZnO 6

Escenarios de exposición del óxido de zinc

IU number	Identified Use (IU) name	GES code
28	Aditivo para la producción de agentes de fricción	GESZnO 1, GESZnO 4
29	Uso de agentes de fricción que contienen ZnO: pastillas de freno	GESZnO 6
30	Aditivo / componente para la producción de vidrio	GESZnO 1, GESZnO 4
31	Tratamiento superficial de vidrio plano	GESZnO 1, GESZnO 4
32	Uso de vidrio y de cerámica que contienen ZnO en vajilla	GESZnO 6
33	Uso de vidrio que contiene ZnO en los visualizadores	GESZnO 6
34	Uso de recubrimientos de película delgada vítreos que contienen ZnO	GESZnO 6
35	Aditivo en la fabricación de componentes electrónicos	GESZnO 1, GESZnO 4
36	Aditivo en la fabricación de ferritas	GESZnO 1, GESZnO 4
37	Aditivo en la producción de varistores	GESZnO 1, GESZnO 4
38	ZnO en material de contacto electrotécnico	GESZnO 1, GESZnO 4
39	Baterías / Pilas combustibles	GESZnO 1, GESZnO 4, GESZnO 5
40	Componente para la producción de caucho, resinas y preparados relacionados	GESZnO 1, GESZnO 5
41	Uso de caucho que contiene ZnO para neumáticos	GESZnO 7
42	Uso de caucho y otras resinas que contienen ZnO para aplicaciones y dispositivos médicos	GESZnO 7
43	Componente para matrices poliméricas, plásticos y preparados relacionados	GESZnO 1, GESZnO 5
44	Uso de polímeros que contienen ZnO para recubrimientos de suelo y pared y preparados similares	GESZnO 7
45	Uso de polímeros que contienen ZnO para recubrimientos aislantes y protectores de cables	GESZnO 7
46	Uso de polímeros que contienen ZnO para tubos y láminas	GESZnO 7
47	Uso de polímeros que contienen ZnO para artículos moldeados	GESZnO 7
48	Uso de recubrimientos de película delgada plásticos que contienen ZnO	Generic consumer/environment
49	Aditivo para la producción de sellantes / adhesivos / mástiques	GESZnO 1, GESZnO 5
50	Uso de sellantes / adhesivos / mástiques que contienen ZnO	Generic consumer/environment
51	Aditivo para la producción de lubricantes / grasas / fluidos para trabajar el metal	GESZnO 1, GESZnO 5

Escenarios de exposición del óxido de zinc

IU number	Identified Use (IU) name	GES code
52	Uso de lubricantes / grasas / fluidos para trabajar el metal que contienen ZnO	Generic consumer/environment
53	Aditivo para la producción de abrillantadores / mezclas de cera	GESZnO 1, GESZnO 5
54	Uso de abrillantadores / mezclas de cera que contienen ZnO	Generic consumer/environment
55	Uso de catalizadores que contienen ZnO	GESZnO 1, GESZnO 5
56	Uso de adsorbentes que contienen ZnO	GESZnO 1, GESZnO 5
57	Aditivo para la producción de productos de deshielo	GESZnO 1, GESZnO 5
58	Uso de productos de deshielo que contienen ZnO	Generic consumer/environment
59	Aditivo para la producción de productos pirotécnicos	GESZnO 1, GESZnO 4
60	Uso de productos pirotécnicos que contienen ZnO	Generic consumer/environment
61	Aditivo para la formulación de aditivos de nutrición	GESZnO 1, GESZnO 4, GESZnO 5
62	Aditivo para la formulación de alimentos para animales	GESZnO 1, GESZnO 4, GESZnO 5
63	Aditivo para la formulación de productos biocidas	GESZnO 1, GESZnO 4, GESZnO 5
64	Uso de productos biocidas que contienen ZnO	GESZnO 6, GESZnO 7, Generic consumer/environment
65	Aditivo para la formulación de productos de limpieza	GESZnO 1, GESZnO 4, GESZnO 5
66	Uso de productos de limpieza que contienen ZnO	GESZnO 6, GESZnO 7, Generic consumer/environment
67	Aditivo para la formulación de fertilizantes	GESZnO 1, GESZnO 4, GESZnO 5
68	Uso de formulaciones de fertilizantes que contienen ZnO	Generic consumer/environment
69	Aditivo en la formulación de cosméticos	GESZnO 1, GESZnO 4, GESZnO 5
70	Uso de cosméticos	GESZnO 6, GESZnO 7, Generic consumer/environment
71	Aditivo en productos odontológicos	GESZnO 1, GESZnO 4, GESZnO 5
72	Aditivo en la formulación de productos farmacéuticos / veterinarios	GESZnO 1, GESZnO 4, GESZnO 5
73	Uso en productos farmacéuticos / veterinarios	GESZnO 6, GESZnO 7, Generic consumer/environment
74	Uso de pinturas desincrustantes (barcos)	GESZnO 7, Generic consumer/environment
75	Preparación de sustratos: arenado de superficies entre aplicación de recubrimientos	GESZnO 6

Escenarios de exposición del óxido de zinc

<p>GES ZnO-0: Industrial use of primary or secondary zinc bearing material in the manufacture of ZnO by several pyro-or hydrometallurgical processes.</p>
<p>SU: 3, 8, 9 PROC: 1, 2, 3, 4,5 , 8b, 9, 22, 26 PC: 19, 20 AC: not applicable ERC: 1, 6a</p>
<p>Description of activities and processes covered in the exposure scenario:</p> <p>There are 3 production processes for ZnO:</p> <ul style="list-style-type: none"> • the indirect process <p>In this process, the starting material is zinc metal (with a purity of 92 – 99.995 %), refined metal, metallic residues and scrap.</p> <p>The zinc metal is melted, vaporised by boiling and oxidised in the vapour state to zinc oxide with excess of air.</p> <p>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.</p> <ul style="list-style-type: none"> • the direct process <p>In this process, the starting material is zinc oxide containing residue.</p> <p>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.</p> <ul style="list-style-type: none"> • the wet process <p>In this process, the starting material is a purified zinc salt solution (predominantly dithionate, sulphate or chloride).</p> <p>Zinc hydroxide and/or carbonate are subsequently precipitated by the addition of alkalines and filtered from the solutions.</p> <p>Finally, zinc oxide is generated by calcination (dehydration, de-carboxylation) of the Zinc hydroxide or Zinc carbonate or a mixture of both.</p> <p>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</p>
<p>Contributing scenario (1) controlling environmental exposure</p>
<p>Product characteristics: see sections 3 (composition) & 9 (phys-chem properties) of SDS ZnO is produced in minimum 80% purity</p>
<p>Amounts used: maximum 50000 T/y</p>
<p>Frequency and duration of use: Continuous production</p>

Escenarios de exposición del óxido de zinc

<p>Environment factors not influenced by risk management: Flow rate receiving waters default for generic scenario: 18,000 m³/d, unless specified otherwise</p>
<p>Other given operational conditions affecting environmental exposure:</p> <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.
<p>Technical conditions and measures at process level (source) to prevent release: See MSDS section 8.2.3</p>
<p>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil: See section 8.2.3 of SDS</p>
<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 of the municipal STP (2000 m³/d), unless specified otherwise.</p>
<p>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.</p>
<p>Conditions and measures related to external recovery of waste:</p> <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.
<p>Contributing scenario (2) controlling worker exposure</p>
<p>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.</p>
<p>Amounts used: Maximum 96 T/day, 32T/shift</p>
<p>Frequency and duration of use/exposure: 8hrs shift</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: All processes are carried out indoor in confined areas.</p>
<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>

Escenarios de exposición del óxido de zinc

- Wearing of gloves and protective clothing is compulsory (efficiency $\geq 90\%$).
- 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.)

Escenarios de exposición del óxido de zinc

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 m ³ /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
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

Escenarios de exposición del óxido de zinc

and conveyed according to the waste legislation.
Contributing scenario (2) controlling worker exposure
<p>Product characteristic: see sections 3 (composition) & 9 (phys-chem properties) of SDS</p> <p>The preparation can be solid or liquid.</p> <p>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>
Amounts used: Max 5000T/y = 14T/d = 5T/shift depending on the application.
<p>Frequency and duration of use/exposure:</p> <p>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>
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> <ul style="list-style-type: none"> • high temperature steps can occur; • all indoor processes in confined area.
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
<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.)

Escenarios de exposición del óxido de zinc

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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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: <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

Escenarios de exposición del óxido de zinc

<ul style="list-style-type: none"> • 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> <ul style="list-style-type: none"> • 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.
<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"> • 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.
<p>Amounts used: Up to maximum 25T/shift</p>
<p>Frequency and duration of use/exposure: 8hrs shift (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: All processes are carried out indoor in confined areas.</p>
<p>Technical conditions and measures at process level (source) to prevent release: see section 8.2.1. of SDS</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:</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.)

Escenarios de exposición del óxido de zinc

GES ZnO-3: Industrial and professional use of ZnO as active laboratory reagent in aqueous or organic media, for analysis or synthesis.
SU: 3, 10, 22, 24 PROC: 1, 2, 3, 4, 5, 8b, 9, 15 PC: 19, 21, 28, 39 AC: not applicable ERC: 1,2, 4, 6a, 6b, 8a, 8b, 8d
Contributing scenario (1) controlling environmental exposure
The zinc oxide is used for: <u>Analysis</u> : sample (solid or liquid) treatment or preparation: the substance is in the sample or in the reagent <u>Synthesis</u> : manipulations are usually under ventilation (e.g. laminar flow, ventilation hood) The substance is used at the industrial scale, in industrial installations for air control and water treatment and at the professional scale by laboratories
Product characteristics : see sections 3 (composition) & 9 (phys-chem properties) of SDS
Amounts used : <ul style="list-style-type: none"> • maximum 5 T/y (industrial scale) • maximum 0.5 T/y (professional scale)
Frequency and duration of use : Use is usually intermittent but continuous use 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 All processes are performed indoor in a confined area, with dedicated laboratory equipment. All solid residues containing zinc are recovered for recycling.
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 <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.
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 (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 :

Escenarios de exposición del óxido de zinc

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
Amounts used: <ul style="list-style-type: none"> • maximum 5 T/y (industrial scale) • maximum 0.5 T/y (professional scale)
Frequency and duration of use/exposure: Use is usually intermittent but continuous use is assumed as a worst case
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"> • high temperature steps can occur in protected zones (fume cupboards); • all indoor processes in confined area, including hazardous substances cabinets.
Technical conditions and measures at process level (source) to prevent release: see section 8.2.1. of SDS for general measures
Technical conditions and measures to control dispersion from source towards the worker: See section 8.2.1 of SDS for general measures Local exhaust ventilation systems are provided where needed on the benches and in the fume cupboards.
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

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.)

Escenarios de exposición del óxido de zinc

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

Escenarios de exposición del óxido de zinc

<ul style="list-style-type: none"> • 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.
<p>Conditions and measures related to external recovery of waste</p> <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.
<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"> • 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
<p>Amounts used: Max 5000T/y = 15T/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</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"> • Dry processes: dry operational conditions throughout the process; no process waters; • high temperature steps can occur; • indoor processes in confined area.
<p>Technical conditions and measures at process level (source) to prevent release: see section 8.2.1 of SDS</p>
<p>Technical conditions and measures to control dispersion from source towards the worker: see section 8.2.1 of SDS</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 (personal protection)</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.)

Escenarios de exposición del óxido de zinc

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: <ul style="list-style-type: none"> • 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 m ³ /d, unless specified otherwise
Other given operational conditions affecting environmental exposure <ul style="list-style-type: none"> • 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 (2000m 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 <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

Escenarios de exposición del óxido de zinc

<ul style="list-style-type: none"> 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"> 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.)

Escenarios de exposición del óxido de zinc

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
Other given operational conditions affecting environmental exposure <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.
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 In industrial and professional setting, the following applies: <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
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 m3/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

Escenarios de exposición del óxido de zinc

<ul style="list-style-type: none"> • 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) See section 8.2.3. for more specific abatement systems</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.)

Escenarios de exposición del óxido de zinc

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: <ul style="list-style-type: none"> • 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 m ³ /d, unless specified otherwise
Other given operational conditions affecting environmental exposure <ul style="list-style-type: none"> • 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

Escenarios de exposición del óxido de zinc

All residues are recycled or handled and conveyed according to waste legislation.
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"> • 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.
<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.
Frequency and duration of use/exposure: 8 hour shifts (default worst case) are assumed as starting point
<p>Human factors not influenced by risk management</p> <p>Uncovered body parts, (potentially) face exposed as a result of the nature of the activity</p>
<p>Other given operational conditions affecting workers exposure</p> <p>Industrial / Professional: Wet processes, all indoor in confined area.</p>
Technical conditions and measures at process level (source) to prevent release: see section 8.2.1.
<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). See section 8.2.1 of SDS</p>
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