

prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

APPENDIX: EXPOSURE SCENARIOS

The current document includes all relevant occupational and environmental exposure scenarios (ES) for the production and use of calcium dihydroxide as required under the REACH Regulation (Regulation (EC) No 1907/2006). For the development of the ES the Regulation and the relevant REACH Guidance have been considered. For the description of the covered uses and processes, the "R.12 – Use descriptor system" guidance (Version: 2, March 2010, ECHA-2010-G-05-EN), for the description and implementation of risk management measures (RMM) the "R.13 – Risk management measures" guidance (Version: 1.1, May 2008), for the occupational exposure estimation the "R.14 – Occupational exposure estimation" guidance (Version: 2, May 2010, ECHA-2010-G-09-EN) and for the actual environmental exposure assessment the "R.16 – Environmental Exposure Assessment" (Version: 2, May 2010, ECHA-10-G-06-EN) was used.

Methodology used for environmental exposure assessment

The environmental exposure scenarios only address the assessment at the local scale, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, for industrial and professional uses as any effects that might occur is expected to take place on a local scale.

1) Industrial uses (local scale)

The exposure and risk assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions in the industrial stages mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH⁻ discharges. The exposure assessment for the aquatic environment only deals with the possible pH changes in STP effluent and surface water related to the OH⁻ discharges at the local scale and is performed by assessing the resulting pH impact: the surface water pH should not increase above 9 (In general, most aquatic organisms can tolerate pH values in the range of 6-9).

Risk management measures related to the environment aim to avoid discharging calcium dihydroxide solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. Discharges should be carried out such that pH changes in receiving surface waters are minimised. The effluent pH is normally measured and can be neutralised easily, as often required by national laws.

2) Professional uses (local scale)

The exposure and risk assessment is only relevant for the aquatic and terrestrial environment. The aquatic effect and risk assessment is determined by the pH effect. Nevertheless, the classical risk characterisation ratio (RCR), based on PEC (predicted environmental concentration) and PNEC (predicted no effect concentration) is calculated. The professional uses on a local scale refer to applications on agricultural or urban soil. The environmental exposure is assessed based on data and a modelling tool. The modelling FOCUS/ Exposit tool is used to assess terrestrial and aquatic exposure (typically conceived for biocidal applications).

Details and scaling approach indications are reported in the specific scenarios.



PRODUCT SAFETY DATA SHEET for Ca(OH)2

prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Methodology used for occupational exposure assessment

By definition an exposure scenario (ES) has to describe under which operational conditions (OC) and risk management measure (RMMs) the substance can be handled safely. This is demonstrated if the estimated exposure level is below the respective derived no-effect level (DNEL), which is expressed in the risk characterisation ratio (RCR). For workers, the repeated dose DNEL for inhalation as well as the acute DNEL for inhalation are based on the respective recommendations of the scientific committee on occupational exposure limits (SCOEL) being 1 mg/m³ and 4 mg/m³, respectively. In cases where neither measured data nor analogous data are available, human exposure is assessed with the aid of a modelling tool. At the first tier screening level, the MEASE tool (http://www.ebrc.de/mease.html) is used to assess inhalation exposure according to the ECHA guidance (R.14).

Since the SCOEL recommendation refers to <u>respirable dust</u> while the exposure estimates in MEASE reflect the <u>inhalable</u> fraction, an additional safety margin is inherently included in the exposure scenarios below when MEASE has been used to derive exposure estimates.

Methodology used for consumer exposure assessment

By definition an ES has to describe under which conditions the substances, preparation or articles can be handled safely. In cases where neither measured data nor analogous data are available, exposure is assessed with the aid of a modelling tool.

For consumers, the repeated dose DNEL for inhalation as well as the acute DNEL for inhalation are based on the respective recommendations of the Scientific Committee on Occupational Exposure Limits (SCOEL), being 1 mg/m³ and 4 mg/m³, respectively.

For inhalation exposure to powders the data, derived from van Hemmen (van Hemmen, 1992: Agricultural pesticide exposure data bases for risk assessment. Rev Environ Contam Toxicol. 126: 1-85.), has been used to calculate the inhalation exposure. The inhalation exposure for consumers is estimated at 15 μ g/hr or 0.25 μ g/min. For larger tasks the inhalation exposure is expected to be higher. A factor of 10 is suggested when the product amount exceeds 2.5 kg, resulting in the inhalation exposure of 150 μ g/hr. To convert these values in mg/m³ a default value of 1.25 m³/hr for the breathing volume under light working conditions will be assumed (van Hemmen, 1992) giving 12 μ g/m³ for small tasks and 120 μ g/m³ for larger tasks.

When the preparation or substance is applied in granular form or as tablets, reduced exposure to dust was assumed. To take this into account if data about particle size distribution and attrition of the granule are lacking, the model for powder formulations is used, assuming a reduction in dust formation by 10 % according to Becks and Falks (Manual for the authorisation of pesticides. Plant protection products. Chapter 4 Human toxicology; risk operator, worker and bystander, version 1.0., 2006).

For dermal exposure and exposure to the eye a qualitative approach has been followed, as no DNEL could be derived for this route due to the irritating properties of calcium oxide. Oral exposure was not assessed as this is not a foreseeable route of exposure regarding the uses addressed. Since the SCOEL recommendation refers to respirable dust while the exposure estimates by the model from van Hemmen reflect the inhalable fraction, an additional safety margin is inherently included in the exposure scenarios below, i.e. the exposure estimates are very conservative.

The exposure assessment of calcium dihydroxide professional and industrial and consumer use is performed and organized based on several scenarios. An overview of the scenarios and the coverage of substance life cycle is presented in Table 1.

Nordkalk

PRODUCT SAFETY DATA SHEET for Ca(OH)2

prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Table 1: Overview on exposure scenarios and coverage of substance life cycle

		osure nario title			Process	Article	Environmental					
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Iden		Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)
9.1	Manufacture and industrial uses of aqueous solutions of lime substances	x	x	x		х	1	3; 1, 2a, 2b, 4, 5, 6a, 6b, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7, 12a, 12b, 10a, 10b, 11a, 11b
9.2	Manufacture and industrial uses of low dusty solids/powders of lime substances	x	x	x		х	2	3; 1, 2a, 2b, 4, 5, 6a, 6b, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27a, 27b	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7, 12a, 12b, 10a, 10b, 11a, 11b
9.3	Manufacture and industrial uses of medium dusty solids/powders of lime substances	х	x	x		х	3	3; 1, 2a, 2b, 4, 5, 6a, 6b, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7, 12a, 12b, 10a, 10b, 11a, 11b

Nordkalk prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

	Exposure			Process	Article	Environmental						
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Iden	Sector of use category (SU)	Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)
9.4	Manufacture and industrial uses of high dusty solids/powders of lime substances	x	x	x		х	4	3; 1, 2a, 2b, 4, 5, 6a, 6b, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7, 12a, 12b, 10a, 11a
9.5	Manufacture and industrial uses of massive objects containing lime substances	х	x	x		x	5	3; 1, 2a, 2b, 4, 5, 6a, 6b, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	6, 14, 21, 22, 23, 24, 25	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7, 12a, 12b, 10a, 10b, 11a, 11b
9.6	Professional uses of aqueous solutions of lime substances		x	x		х	6	22; 1, 5, 6a, 6b, 7, 10, 11, 12, 13, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	2, 3, 4, 5, 8a, 8b, 9, 10, 12, 13, 15, 16, 17, 18, 19	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	2, 8a, 8b, 8c, 8d, 8e, 8f

Nordkalk prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

			Identified uses		Resultin g life cycle stage				Process	Article	Environmental	
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Ident	category (SU)	Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)
9.7	Professional uses of low dusty solids/powders of lime substances		x	x		x	7	22; 1, 5, 6a, 6b, 7, 10, 11, 12, 13, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	2, 3, 4, 5, 8a, 8b, 9, 10, 13, 15, 16, 17, 18, 19, 21, 25, 26	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	2, 8a, 8b, 8c, 8d, 8e, 8f
9.8	Professional uses of medium dusty solids/powders of lime substances		x	x		х	8	22; 1, 5, 6a, 6b, 7, 10, 11, 12, 13, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	2, 3, 4, 5, 8a, 8b, 9, 10, 13, 15, 16, 17, 18, 19, 25, 26	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	2, 8a, 8b, 8c, 8d, 8e, 8f, 9a, 9b
9.9	Professional uses of high dusty solids/powders of lime substances		x	x		Х	9	22; 1, 5, 6a, 6b, 7, 10, 11, 12, 13, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	2, 3, 4, 5, 8a, 8b, 9, 10, 13, 15, 16, 17, 18, 19, 25, 26	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	2, 8a, 8b, 8c, 8d, 8e, 8f

Nordkalk prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

				Identified uses		Resultin g life cycle stage				Process	Article	Environmental
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Identified Use	Sector of use category (SU)	Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)
9.10	Professional use of lime substances in soil treatment		x	x			10	22	9b	5, 8b, 11, 26		2, 8a, 8b, 8c, 8d, 8e, 8f
9.11	Professional uses of articles/containe rs containing lime substances			x		х	11	22; 1, 5, 6a, 6b, 7, 10, 11, 12, 13, 16, 17, 18, 19, 20, 23, 24		0, 21, 24, 25	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	10a, 11a, 11b, 12a, 12b
9.12	Consumer use of building and construction material (DIY)				х		12	21	9b, 9a			8
9.13	Consumer use of CO ₂ absorbent in breathing apparatuses				x		13	21	2			8

Nordkalk prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

			lde use	entifi es	ed	Resultin g life cycle stage	entified Use			Process	Article	Environmental
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Iden	category (SU)	Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)
9.14	Consumer use of garden lime/fertilizer				x		14	21	20, 12			8e
9.15	Consumer use of lime substances as water treatment chemicals in aquaria				x		15	21	20, 37			8
9.16	Consumer use of cosmetics containing lime substances				x		16	21	39			8



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.1: Manufacture and industrial uses of aqueous solutions of lime substances

Exposure Scenario	Format (1) addressing uses carried out	by workers					
1. Title							
Free short title	Manufacture and industrial uses of aque	eous solutions of lime substances					
Systematic title based on use descriptor	 SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14, SU15, SU16, SU17, SU18, SU19, SU20, SU23, SU24 PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC38, PC39, PC40 AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13 (appropriate PROCs and ERCs are given in Section 2 below) 						
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered	d are described in Section 2 below.					
Assessment Method	The assessment of inhalation exposure is based	on the exposure estimation tool MEASE.					
2. Operational con	ditions and risk management measures						
PROC/ERC	REACH definition	Involved tasks					
PROC 1	Use in closed process, no likelihood of exposure						
PROC 2	Use in closed, continuous process with occasional controlled exposure						
PROC 3	Use in closed batch process (synthesis or formulation)						
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises						
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)						
PROC 7	Industrial spraying						
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities						
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities	Further information is provided in the ECHA					
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Guidance on information requirements and					
PROC 10	Roller application or brushing	chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-					
PROC 12	Use of blowing agents in manufacture of foam	EN).					
PROC 13	Treatment of articles by dipping and pouring						
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation						
PROC 15	Use as laboratory reagent						
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected						
PROC 17	Lubrication at high energy conditions and in partly open process						
PROC 18	Greasing at high energy conditions]					
PROC 19	Hand-mixing with intimate contact and only PPE available	1					
ERC 1-7, 12	Manufacture, formulation and all types of industrial uses						
ERC 10, 11	Wide-dispersive outdoor and indoor use of long-life articles and materials						



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposusion effected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted at ambient temperature the fugacity is based on the dustiness of that substance. Howerse emission potential. Taqueous solutions (PROC 7 and 11) is assumed to be involved with a medium emission. PROC Use in preparation Content in preparation Physical form PROC 7 not restricted aqueous solution Aqueous solution All other applicable PROCs not restricted aqueous solution PROC 7 not restricted aqueous solution Amounts used The actual tonnage handled per shift is not considered to influence the exposure as such for this scenar combination of the scale of operation (industrial vs. professional) and level of containment/automation (rePROC) the main determinant of the process intrinsic emission potential. Frequency and duration of use/exposure PROC 7 240 minutes All other applicable PROCs Second 100 Process intrinsic emission potential. Frequency and duration of use/exposure 240 minutes PROC 7 ≤ 240 minutes All other applicable PROCs Second 100 Process in thirsic emission potential. Frequency and duration of used in hot-metallurgical processes, operational conditions (e.g. proprocess pressure) are not considered relevant for occupational exposure assessment of the conduc	characteristic			
PRCC Use in preparation preparation Physical form PROC 7 not restricted aqueous solution All other applicable PROCs not restricted aqueous solution Amounts used aqueous solution aqueous solution Amounts used Frequency and duration of use/exposure aqueous solution (industrial vs. professional) and level of containment/automation (aprecisional) PROC 7 ≤ 240 minutes All other applicable 480 minutes (not restricted) Human factors not influenced by risk management aprecisional exposure assessment of the conducted Technical conditions are not used in hot-metallurgical processes, operational conditions (e.g. procisional exposure	ed by an assignment of a so-called fugacity class in the temperature the fugacity is based on the dustines ure based, taking into account the process temperat tasks are based on the level of abrasion instead of t	the MEASE tool. For s of that substance ture and the melting the substance intrin	or operations conducte . Whereas in hot metal g point of the substanc nsic emission potential.	ed with solid substance operations, fugacity is e. As a third group, hig
PROC 7 not restricted aqueous solution All other applicable PROCs not restricted aqueous solution Amounts used Amounts used aqueous solution The actual tonnage handled per shift is not considered to influence the exposure as such for this scenar combination of the scale of operation (industrial vs. professional) and level of containment/automation (PROC) is the main determinant of the process intrinsic emission potential. Frequency and duration of use/exposure PROC 7 ≤ 240 minutes All other applicable PROCs 480 minutes (not restricted) Human factors not influenced by risk management 480 minutes (not restricted) Human factors not onditions affecting workers exposure Since aqueous solutions are not used in hot-metallurgical processes, operational conditions (e.g. proprocess pressure) are not considered relevant for occupational exposure assessment of the conducted Technical conditions and measures at process level (source) to prevent release Risk management measures at the process level (source) to prevent release PROC 7 Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure" A reduction of exposure" A reduction of exposure" A reduction of exposure (for example, by the installation of ventialted (positive pressure) control roms or by removing the worker from workplaces involved with not applicable not applicable no trequired not applicable <td>Use in preparation</td> <td>• • • • • • • • • • • • • • • • • • • •</td> <td>Physical form</td> <td>Emission potentia</td>	Use in preparation	• • • • • • • • • • • • • • • • • • • •	Physical form	Emission potentia
PROCs Interestiticted addebut solution Amounts used Amounts used The actual tonnage handled per shift is not considered to influence the exposure as such for this scenar combination of the scale of operation (industrial vs. professional) and level of containment/automation (appRoC) is the main determinant of the process intrinsic emission potential. Frequency and duration of use/exposure PROC PROC 2 Duration of exposure PROC 7 ≤ 240 minutes All other applicable PROCs 480 minutes (not restricted) Human factors not influenced by risk management 480 minutes (not restricted) The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m³/shift Other given operational conditions affecting workers exposure Since aqueous solutions are not used in hot-metallurgical processes, operational conditions (e.g. proprocess pressure) are not considered relevant for occupational exposure assessment of the conducted Technical conditions and measures at process level (source) to prevent release Risk management measures at the process level (source) to prevent release PROC 7 Any potentially required separation from source towards the worker PROC 7 Any potentially required above under "Frequency and duration of exposure". A reduction of exposure (r, reducted) PROC 19 Any potentially required for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involveed with no	not restricted		aqueous solution	medium
The actual tonnage handled per shift is not considered to influence the exposure as such for this scenar combination of the scale of operation (industrial vs. professional) and level of containment/automation (a PROC) is the main determinant of the process intrinsic emission potential. Frequency and duration of use/exposure PROC Duration of exposure PROC 7 ≤ 240 minutes All other applicable PROCs PROC 8 PROC 9 PROC 19 P	applicable not restricted		aqueous solution	very low
combination of the scale of operation (industrial vs. professional) and level of containment/automation (a PROC) is the main determinant of the process intrinsic emission potential. Frequency and duration of use/exposure PROC Duration of exposure PROC 7 ≤ 240 minutes All other applicable PROCs 480 minutes (not restricted) Human factors not influenced by risk management 480 minutes (not restricted) Other given operational conditions affecting workers exposure Since aqueous solutions are not used in hot-metallurgical processes, operational conditions (e.g. proprocess pressure) are not considered relevant for occupational exposure assessment of the conducted Technical conditions and measures at process level (source) to prevent release Risk management measures at the process level (source) to prevent release Risk management measures at the process level (e.g. containment or segregation of the emission source juried in the processes. Efficiency of LC (according to MEASE) PROC 7 Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration of exposure from workplaces involved with not required not required not preducible na <td>s used</td> <td></td> <td></td> <td></td>	s used			
PROC Duration of exposure PROC 7 ≤ 240 minutes All other applicable PROCs 480 minutes (not restricted) Human factors not influenced by risk management 480 minutes (not restricted) Human factors not influenced by risk management The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m³/shift Other given operational conditions affecting workers exposure Since aqueous solutions are not used in hot-metallurgical processes, operational conditions (e.g. proprocess pressure) are not considered relevant for occupational exposure assessment of the conducted Technical conditions and measures at process level (source) to prevent release Risk management measures at the process level (source) to prevent release Risk management measures to control dispersion from source towards the worker PROC Level of separation Localised controls (LC) Efficiency of LC (according to MEASE) PROC 7 Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure". A reduction of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with not applicable na	ion of the scale of operation (industrial vs. professio	nal) and level of co		
PROC 7 ≤ 240 minutes All other applicable PROCs 480 minutes (not restricted) Human factors not influenced by risk management 480 minutes (not restricted) Human factors not influenced by risk management The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m³/shift Other given operational conditions affecting workers exposure Since aqueous solutions are not used in hot-metallurgical processes, operational conditions (e.g. proprocess pressure) are not considered relevant for occupational exposure assessment of the conducted Technical conditions and measures at process level (source) to prevent release Risk management measures at the process level (source) to prevent release Risk management measures at the process level (e.g. containment or segregation of the emission source used in the processes. Efficiency of LC (according to MEASE) PROC Level of separation Localised controls (LC) Efficiency of LC (according to MEASE) PROC 7 Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration for exposure in ort applicable na All other applicable workplaces involved with not required na	cy and duration of use/exposure			
All other applicable PROCs 480 minutes (not restricted) Human factors not influenced by risk management The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m³/shift Other given operational conditions affecting workers exposure Since aqueous solutions are not used in hot-metallurgical processes, operational conditions (e.g. proprocess pressure) are not considered relevant for occupational exposure assessment of the conducted Technical conditions and measures at process level (source) to prevent release Risk management measures at the process level (e.g. containment or segregation of the emission source quired in the processes. Technical conditions and measures to control dispersion from source towards the worker PROC Level of separation Localised controls (LC) Efficiency of LC (according to MEASE) PROC 19 Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with not applicable na		Duration of ex	cposure	
PROCs 480 minutes (not restricted) Human factors not influenced by risk management The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m³/shift Other given operational conditions affecting workers exposure Since aqueous solutions are not used in hot-metallurgical processes, operational conditions (e.g. proprocess pressure) are not considered relevant for occupational exposure assessment of the conducted Technical conditions and measures at process level (source) to prevent release Risk management measures at the process level (e.g. containment or segregation of the emission sourcequired in the processes. Technical conditions and measures to control dispersion from source towards the worker PROC Level of separation Localised controls (LC) Efficiency of LC (according to MEASE) PROC 7 Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with not applicable na		≤ 240 minı	utes	
The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m³/shift Other given operational conditions affecting workers exposure Since aqueous solutions are not used in hot-metallurgical processes, operational conditions (e.g. proprocess pressure) are not considered relevant for occupational exposure assessment of the conducted Technical conditions and measures at process level (source) to prevent release Risk management measures at the process level (e.g. containment or segregation of the emission source quired in the processes. Technical conditions and measures to control dispersion from source towards the worker PROC Level of separation Localised controls (LC) Efficiency of LC (according to MEASE) PROC 7 Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with not required not required not required not prevent release not applicable not required not required not required not prevent release	applicable	480 minutes (not	restricted)	
Other given operational conditions affecting workers exposure Since aqueous solutions are not used in hot-metallurgical processes, operational conditions (e.g. proprocess pressure) are not considered relevant for occupational exposure assessment of the conducted Technical conditions and measures at process level (source) to prevent release Risk management measures at the process level (e.g. containment or segregation of the emission source quired in the processes. Technical conditions and measures to control dispersion from source towards the worker PROC Level of separation Localised controls (LC) Efficiency of LC (according to MEASE) PROC 7 Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with not applicable na	actors not influenced by risk management			
Since aqueous solutions are not used in hot-metallurgical processes, operational conditions (e.g. proprocess pressure) are not considered relevant for occupational exposure assessment of the conducted Technical conditions and measures at process level (source) to prevent release Risk management measures at the process level (e.g. containment or segregation of the emission sourequired in the processes. Technical conditions and measures to control dispersion from source towards the worker PROC Level of separation Localised controls (LC) Efficiency of LC (according to MEASE) PROC 7 Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with not applicable na	breathing volume during all process steps reflected	in the PROCs is as	ssumed to be 10 m ³ /sh	ift (8 hours).
PROCLevel of separationLocalised controls (LC)Efficiency of LC (according to MEASE)PROC 7Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved withlocal exhaust ventilation78 %All other applicable(positive pressure) control rooms or by removing the worker from workplaces involved withnot requiredna	bressure) are not considered relevant for occupation al conditions and measures at process level (sour magement measures at the process level (e.g. contain the processes.	al exposure assess arce) to prevent re ainment or segrega	sment of the conducted	d processes.
PROCLevel of separationLocalised controls (LC)(according to MEASE)PROC 7Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved withlocal exhaust ventilation78 %All other applicable(positive pressure) control rooms or by removing the worker from workplaces involved withnot requiredna				
PROC 7 separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with not applicable na	Level of separation		(according to	Further information
PROC 19 duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with not required na not applicable na	separation of workers from the emission source is indicated		78 %	-
All other applicable or by removing the worker from workplaces involved with not required na	duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated	not applicable	na	-
	applicable or by removing the worker from workplaces involved with	not required	na	-
Organisational measures to prevent /limit releases, dispersion and exposure	ational measures to prevent /limit releases, dispe	ersion and exposu	ıre	
Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe har substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning w	alation or ingestion. General occupational hygiene r	measures are requi	ired to ensure a safe ha	



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

PROC Specification of respiratory protective equipment (RPE) RPE efficiency (assigned protection factor, APF) Specification of gloves Further personal protective equipment (PPE) PROC 7 FFP1 mask APF=4 Since calcium dihydroxide Eventoretion equipment (e.g. opgels or visors) must be worn, unless calcasified as irritating to skin, the acture atype of gloves is managine to the acture atype of gloves is managine to the acture atype of protective (e.g. gloves) is managine to the acture atype of gloves is managine the acture atype of gloves atype aty	Conditions and measur	res related to personal protection	, hygiene and hea	Ith evaluation						
PROC 7 FFP1 mask APF=4 Since calcium dilydroxide is classified as inst be worn, unless classified as inst be worn, unless protective gloves is mandatory from extreme equired to be worn as apportate. Any RPE as defined above shall only be worn if the following principles are implemented in parallel: the out to the threathing resistance and exposure be bown if the other the duration (i.e. closed protective clothing and apportate. Any RPE as defined above shall only be worn if the following principles are implemented in the other threathing resistance and exposure bound therefore be (i) healthy (sepacially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between lace and mask (in view of scara and facial hair). The reconverse and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. 22 Control of environmental exposure 22 Anounts used 22 The daily and annual amount per site (for point sources) is not considered to be the main	PROC		(assigned protection		protective					
All other applicable not required irritiating to skin, the golication (i.e. closed protective gloves is mandatory to rail process). Additionally, face protection, protective dotting and safety shoes are required to be worn as appropriate. Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the contours of the face property and securely. The ecompended devices above which rely on a tight face seal will not provide the required protection unless they fit due contors of the face property and securely. The employer and self-employed persons have legal responsibilities for the workers. An overview of the APE's of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE. 2.2 Control of environmental exposure Prequency and duration of use Intermittent (< 12 time per year) or continuous use/release	PROC 7	FFP1 mask APF=4 equipment (e.g. goggles or visors) must be worn, unlex Since calcium dihydroxide is the eye can be								
(compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE. 2.2 Control of environmental exposure Amounts used The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental exposure. Frequency and duration of use Intermittent (< 12 time per year) or continuous use/release Environment factors not influenced by risk management Flow rate of receiving surface water: 18000 m³/day Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures to reduce or limit discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the	PROCs	other applicable DCsnot requirednairritating to skin, the use of protective gloves is mandatory for all process steps.nature and application (process). Ad face prot protective cl safety shi required to b								
Amounts used The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental exposure. Frequency and duration of use Intermittent (< 12 time per year) or continuous use/release	breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.									
The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental exposure. Frequency and duration of use Intermittent (< 12 time per year) or continuous use/release Environment factors not influenced by risk management Flow rate of receiving surface water: 18000 m³/day Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste	2.2 Control of envi	ronmental exposure								
exposure. Frequency and duration of use Intermittent (< 12 time per year) or continuous use/release	Amounts used									
Intermittent (< 12 time per year) or continuous use/release Environment factors not influenced by risk management Flow rate of receiving surface water: 18000 m³/day Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste		mount per site (for point sources)	is not considered t	to be the main determ	inant for environmental					
Environment factors not influenced by risk management Flow rate of receiving surface water: 18000 m³/day Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste	Frequency and duration	n of use								
Flow rate of receiving surface water: 18000 m³/day Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste	Intermittent (< 12 time pe	er year) or continuous use/release								
Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste	Environment factors no	ot influenced by risk management	t							
Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste	Flow rate of receiving sur	rface water: 18000 m³/day								
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste	Other given operationa	I conditions affecting environmer	ntal exposure							
Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.	Effluent discharge rate: 2000 m³/day									
to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.	Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil									
	to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The									
Solid industrial waste of lime should be reused or discharged to the industrial wastewater and further neutralized if needed.	Conditions and measur	res related to waste								
	Solid industrial waste of I	ime should be reused or discharged	d to the industrial wa	astewater and further n	eutralized if needed.					



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium dihydroxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19	MEASE	< 1 mg/m³ (0.001 – 0.66)	irritating to skin, derr minimised as far as DNEL for dermal derived. Thus, der	roxide are classified as nal exposure has to be technically feasible. A effects has not been rmal exposure is not exposure scenario.

Environmental exposure

The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions of lime substance in the different life-cycle stages (production and use) mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, being the toxicity of Ca2+ is expected to be negligible compared to the (potential) pH effect. Only the local scale is being addressed, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, both for production and industrial use as any effects that might occur would be expected to take place on a local scale. The high water solubility and very low vapour pressure indicate that lime substance will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure of lime substance. Significant emissions or exposure to the terrestrial environment are not expected either for this exposure scenario. The exposure assessment for the aquatic environment will therefore only deal with the possible pH changes in STP effluent and surface water related to the OH- discharges at the local scale. The exposure assessment is approached by assessing the resulting pH impact: the surface water pH should not increase above 9.

Environmental emissions	The production of lime substance can potentially result in an aquatic emission and locally increase the lime substance concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from lime substance production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.
Exposure concentration in waste water treatment plant (WWTP)	Waste water from lime substance production is an inorganic wastewater stream and therefore there is no biological treatment. Therefore, wastewater streams from lime substance production sites will normally not be treated in biological waste water treatment plants (WWTPs), but can be used for pH control of acid wastewater streams that are treated in biological WWTPs.
Exposure concentration in aquatic pelagic compartment	When lime substance is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion (CO32-).
Exposure concentration in sediments	The sediment compartment is not included in this ES, because it is not considered relevant for lime substance: when lime substance is emitted to the aquatic compartment, sorption of to sediment particles is negligible.
Exposure concentrations in soil and groundwater	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for lime substance: when emitted to air as an aerosol in water, lime substance is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised lime substance largely end up in soil and water.
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for lime substance: a risk assessment for secondary poisoning is therefore not required.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Occupational exposure

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. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustinesy ".

DNEL_{inhalation}: 1 mg/m³ (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

Environmental exposure

If a site does not comply with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to perform a more site-specific assessment. For that assessment, the following stepwise approach is recommended.

Tier 1: retrieve information on effluent pH and the contribution of the lime substance on the resulting pH. Should the pH be above 9 and be predominantly attributable to lime, then further actions are required to demonstrate safe use.

Tier 2a: retrieve information on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the value of 9. If the measures are not available, the pH in the river can be calculated as follows:

$$pHriver = Log \left[\frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent} \right]$$
(Eq 1)

Where:

Q effluent refers to the effluent flow (in m³/day)

Q river upstream refers to the upstream river flow (in m³/day)

pH effluent refers to the pH of the effluent

pH upstream river refers to the pH of the river upstream of the discharge point

Please note that initially, default values can be used:

- Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000 m³/day
- Q effluent: use default value of 2000 m³/day
- The upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this can be justified.

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

Tier 2b: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the lime substance.

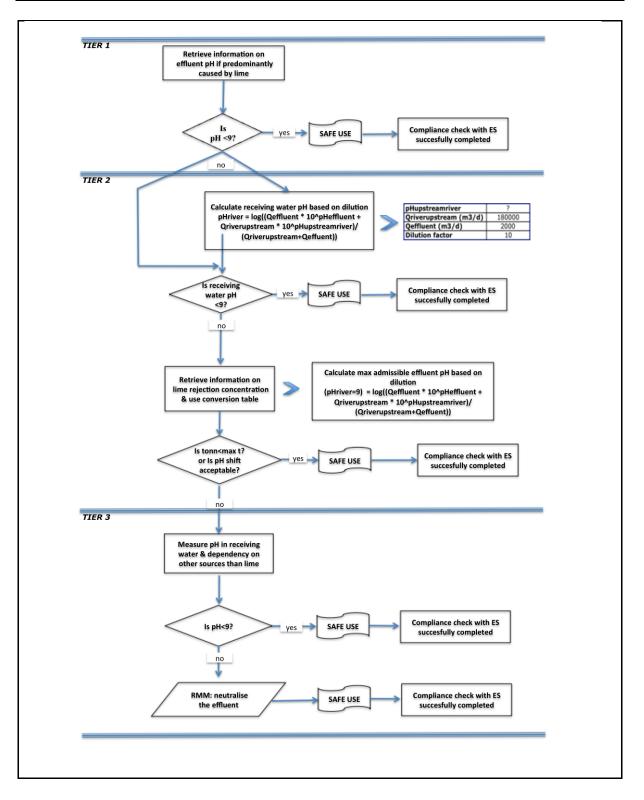
Tier 3: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010





prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.2: Manufacture and industrial uses of low dusty solids/powders of lime substances

Exposure Scenario	Format (1) addressing uses carried out	by workers					
1. Title							
Free short title	Manufacture and industrial uses of low dust	ty solids/powders of lime substances					
Systematic title based on use descriptor	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU14, SU15, SU16, SU17, SU18, PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC PC34, PC35, PC36, PC37, AC1, AC2, AC3, AC4, AC5, AC6, AC (appropriate PROCs and ERCs ar	, SU19, SU20, SU23, SU24 212, PC13, PC14, PC15, PC16, PC17, PC18, 27, PC28, PC29, PC30, PC31, PC32, PC33, PC38, PC39, PC40 C7, AC8, AC10, AC11, AC13					
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are described in Section 2 below.						
Assessment Method	The assessment of inhalation exposure is based	I on the exposure estimation tool MEASE.					
2. Operational conc	litions and risk management measures						
PROC/ERC	REACH definition	Involved tasks					
PROC 1	Use in closed process, no likelihood of exposure						
PROC 2	Use in closed, continuous process with occasional controlled exposure						
PROC 3	Use in closed batch process (synthesis or formulation)						
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises						
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)						
PROC 6	Calendering operations						
PROC 7	Industrial spraying						
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities						
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities	Further information is provided in the ECHA Guidance on information requirements and					
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-					
PROC 10	Roller application or brushing	EN).					
PROC 13	Treatment of articles by dipping and pouring						
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation						
PROC 15	Use as laboratory reagent						
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected						
PROC 17	Lubrication at high energy conditions and in partly open process						
PROC 18	Greasing at high energy conditions						
PROC 19	Hand-mixing with intimate contact and only PPE available						
PROC 21	Low energy manipulation of substances bound in materials and/or articles						
PROC 22	Potentially closed processing operations with minerals/metals at elevated temperature Industrial setting						



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN Revision date: September/2010

PROC 23	Open processing and transfer of minerals/metals at elevated	emperature									
PROC 24	High (mechanical) energy work-u bound in materials and/o										
PROC 25	Other hot work operations w	vith metals									
PROC 26	Handling of solid inorganic substation temperature	ances at ambient									
PROC 27a	Production of metal powders (h	ot processes)									
PROC 27b	Production of metal powders (v	vet processes)									
ERC 1-7, 12	Manufacture, formulation and all t uses	ypes of industrial									
ERC 10, 11	Wide-dispersive outdoor and indo articles and materia										
2.1 Control of work	ers exposure										
Product characteristic											
According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, high abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential.											
PROC	OC Use in preparation Content in preparation Physical form Emission potential										
PROC 22, 23, 25, 27a	solid/powder										
PROC 24	not restricted		solid/powder	high							
All other applicable PROCs	not restricted		solid/powder	low							
Amounts used											
combination of the scale o	dled per shift is not considered to f operation (industrial vs. profession f the process intrinsic emission pote	al) and level of cont									
Frequency and duration	of use/exposure										
PROC		Duration of ex	posure								
PROC 22		≤ 240 minu	ites								
All other applicable 480 minutes (not restricted)											
Human factors not influenced by risk management											
The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m ³ /shift (8 hours).											
Other given operational conditions affecting workers exposure											
Operational conditions like process temperature and process pressure are not considered relevant for occupational exposure assessment of the conducted processes. In process steps with considerably high temperatures (i.e. PROC 22, 23, 25), the exposure assessment in MEASE is however based on the ratio of process temperature and melting point. As the associated temperatures are expected to vary within the industry the highest ratio was taken as a worst case assumption for the exposure estimation. Thus all process temperatures are automatically covered in this exposure scenario for PROC 22, 23 and PROC 25.											
Technical conditions and measures at process level (source) to prevent release											
Risk management measures at the process level (e.g. containment or segregation of the emission source) are generally not required in the processes.											



PRODUCT SAFETY DATA SHEET for Ca(OH)2

prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information
PROC 7, 17, 18	Any potentially required separation of workers from the emission source is indicated	general ventilation	17 %	-
PROC 19	above under "Frequency and duration of exposure". A	not applicable	na	-
PROC 22, 23, 24, 25, 26, 27a	reduction of exposure duration can be achieved, for example,	local exhaust ventilation	78 %	-
All other applicable PROCs	by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required	na	-
Organisational measure	es to prevent /limit releases, dispo	ersion and exposu	ıre	
These measures involve eating and smoking at the and change clothes at en	ion. General occupational hygiene r good personal and housekeeping p workplace, the wearing of standard d of work shift. Do not wear contami es related to personal protection,	oractices (i.e. regul working clothes an inated clothing at h	ar cleaning with suitab d shoes unless otherwis ome. Do not blow dust	le cleaning devices), n se stated below. Showe
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 22, 24, 27a	FFP1 mask	APF=4		Eye protection equipment (e.g. goggles or visors)
All other applicable PROCs	not required	na	Since calcium dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	must be worn, unless potential contact with the eye can be excluded by the nature and type of application (i.e. close process). Additionally face protection, protective clothing and safety shoes are required to be worn a appropriate.
(compare with "duration of breathing resistance and shall be considered that t For reasons as given abort the use of RPE), (ii) have hair). The recommended the contours of the face p The employer and self-er devices and the manager policy for a respiratory pro- An overview of the APFs 2.2 Control of envir Amounts used	ve shall only be worn if the following of exposure" above) should reflect the mass of the RPE itself, due to the in he worker's capability of using tools ove, the worker should therefore be suitable facial characteristics reduce devices above which rely on a tight oroperly and securely. Inployed persons have legal response ment of their correct use in the work otective device programme including of different RPE (according to BS E ronmental exposure nount per site (for point sources) in	ne additional physic increased thermal s and of communication (i) healthy (especia- cing leakages betwo face seal will not p sibilities for the mai place. Therefore, the g training of the wo (N 529:2005) can b	blogical stress for the w tress by enclosing the l ating are reduced during illy in view of medical p een face and mask (in rovide the required pro ntenance and issue of ney should define and o rkers. e found in the glossary	orker due to the head. In addition, it g the wearing of RPE. roblems that may affect view of scars and facia tection unless they fit respiratory protective document a suitable of MEASE.

Intermittent (< 12 time per year) or continuous use/release



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Environment factors not influenced by risk management

Flow rate of receiving surface water: 18000 m³/day

Other given operational conditions affecting environmental exposure

Effluent discharge rate: 2000 m³/day

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

Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.

Conditions and measures related to waste

Solid industrial waste of lime should be reused or discharged to the industrial wastewater and further neutralized if needed.

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium dihydroxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27a, 27b	MEASE	<1 mg/m³ (0.01 – 0.83)	irritating to skin, dern minimised as far as DNEL for dermal e derived. Thus, der	droxide is classified as nal exposure has to be technically feasible. A effects has not been rmal exposure is not exposure scenario.

Environmental emissions

The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions of calcium dihydroxide in the different life-cycle stages (production and use) mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, being the toxicity of Ca2+ is expected to be negligible compared to the (potential) pH effect. Only the local scale is being addressed, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, both for production and industrial use as any effects that might occur would be expected to take place on a local scale. The high water solubility and very low vapour pressure indicate that calcium dihydroxide will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure of calcium dihydroxide. Significant emissions or exposure to the terrestrial environment are not expected either for this exposure scenario. The exposure assessment for the aquatic environment will therefore only deal with the possible pH changes in STP effluent and surface water related to the OH- discharges at the local scale. The exposure assessment is approached by assessing the resulting pH impact: the surface water pH should not increase above 9.

Environmental emissions	The production of calcium dihydroxide can potentially result in an aquatic emission and locally increase the calcium dihydroxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium dihydroxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.
Exposure	Waste water from calcium dihydroxide production is an inorganic wastewater stream and therefore
concentration in waste	there is no biological treatment. Therefore, wastewater streams from calcium dihydroxide
water treatment plant	production sites will normally not be treated in biological waste water treatment plants (WWTPs),
(WWTP)	but can be used for pH control of acid wastewater streams that are treated in biological WWTPs.
Exposure concentration in aquatic pelagic compartment	When calcium dihydroxide is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion (CO32-).



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

_	
Exposure concentration in sediments	The sediment compartment is not included in this ES, because it is not considered relevant for calcium dihydroxide: when calcium dihydroxide is emitted to the aquatic compartment, sorption of to sediment particles is negligible.
Exposure concentrations in soil and groundwater	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for calcium dihydroxide: when emitted to air as an aerosol in water, calcium dihydroxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium dihydroxide largely end up in soil and water.
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for calcium dihydroxide: a risk assessment for secondary poisoning is therefore not required.
4. Guidance to DU	to evaluate whether he works inside the boundaries set by the ES
Occupational exposure	
met or the downstream us measures are adequate. the respective DNEL (give below. If measured data a (www.ebrc.de/mease.htm according to the MEASE Method (RDM) are define	boundaries set by the ES if either the proposed risk management measures as described above are ser can demonstrate on his own that his operational conditions and implemented risk management This has to be done by showing that they limit the inhalation and dermal exposure to a level below en that the processes and activities in question are covered by the PROCs listed above) as given are not available, the DU may make use of an appropriate scaling tool such as MEASE 1) to estimate the associated exposure. The dustiness of the substance used can be determined glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum d as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" istiness ≥10 % are defined as "high dusty".
DNELinhalation: 1 mg	g/m ³ (as respirable dust)
exists at a level of 4 mg/n acute DNEL is therefore a term exposure estimates	as to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects n ³ . By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long- by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the only be reduced to half-shift as a risk management measure (leading to an exposure reduction of
Environmental exposur	e
	with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to ific assessment. For that assessment, the following stepwise approach is recommended.
	n on effluent pH and the contribution of the calcium dihydroxide on the resulting pH. Should the pH minantly attributable to lime, then further actions are required to demonstrate safe use.
	on on receiving water pH after the discharge point. The pH of the receiving water shall not exceed sures are not available, the pH in the river can be calculated as follows:
pHriver = Log Qe	ffluent $*10^{pHeffluent} + Qriverupstream *10^{pHupstream}$
	$\frac{effluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent}$ (Eq. 1)
	Qriverupstream+Qeffluent [(Eq 1)
Where:	(<i>Eq</i> 1)
Where: Q effluent refer	
Where: Q effluent refer Q river upstrea	$(Eq \ 1)$ s to the effluent flow (in m³/day)
Where: Q effluent refer Q river upstrea pH effluent refe	$(Eq \ 1)$ s to the effluent flow (in m³/day) m refers to the upstream river flow (in m³/day)
Where: Q effluent refer Q river upstrea pH effluent refe pH upstream riv	(<i>Eq 1</i>) s to the effluent flow (in m³/day) m refers to the upstream river flow (in m³/day) ers to the pH of the effluent
Where: Q effluent refer Q river upstrea pH effluent refe pH upstream riv Please note tha	(<i>Eq 1</i>) s to the effluent flow (in m ³ /day) m refers to the upstream river flow (in m ³ /day) ers to the pH of the effluent ver refers to the pH of the river upstream of the discharge point at initially, default values can be used: er upstream flows: use the 10th of existing measurements distribution or use default value of 18000
Where: Q effluent refer Q river upstrea pH effluent refe pH upstream riv Please note tha • Q riv m³/da	(<i>Eq 1</i>) s to the effluent flow (in m ³ /day) m refers to the upstream river flow (in m ³ /day) ers to the pH of the effluent ver refers to the pH of the river upstream of the discharge point at initially, default values can be used: er upstream flows: use the 10th of existing measurements distribution or use default value of 18000



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

Tier 2b: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium dihydroxide.

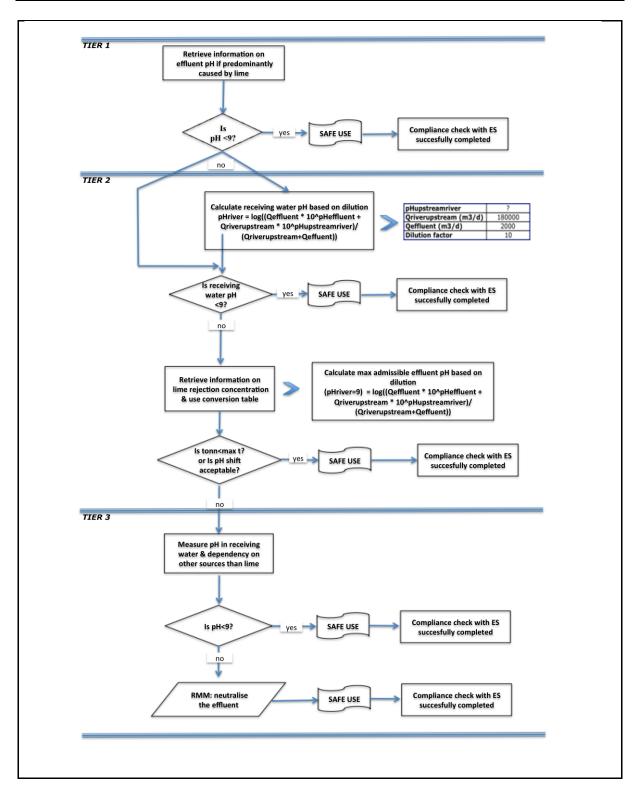
Tier 3: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010





prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN Revision date: September/2010

Printing Date: June/2019

• ES number 9.3: Manufacture and industrial uses of medium dusty solids/powders of lime substances

Exposure Scenario	Format (1) addressing uses carried out	by workers		
1. Title				
Free short title	Manufacture and industrial uses of medium d	usty solids/powders of lime substances		
Systematic title based on use descriptor	 SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14, SU15, SU16, SU17, SU18, SU19, SU20, SU23, SU24 PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC38, PC39, PC40 AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13 (appropriate PROCs and ERCs are given in Section 2 below) 			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered	d are described in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is based	I on the exposure estimation tool MEASE.		
2. Operational cond	ditions and risk management measures			
PROC/ERC	REACH definition	Involved tasks		
PROC 1	Use in closed process, no likelihood of exposure			
PROC 2	Use in closed, continuous process with occasional controlled exposure			
PROC 3	Use in closed batch process (synthesis or formulation)			
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises			
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)			
PROC 7	Industrial spraying			
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities			
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities			
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA Guidance on information requirements and		
PROC 10	Roller application or brushing	chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-		
PROC 13	Treatment of articles by dipping and pouring	EN).		
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation			
PROC 15	Use as laboratory reagent			
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected			
PROC 17	Lubrication at high energy conditions and in partly open process			
PROC 18	Greasing at high energy conditions			
PROC 19	Hand-mixing with intimate contact and only PPE available			
PROC 22	Potentially closed processing operations with minerals/metals at elevated temperature Industrial setting			
PROC 23	Open processing and transfer operations with minerals/metals at elevated temperature			
PROC 24	High (mechanical) energy work-up of substances bound in materials and/or articles			



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

PROC 25	Other hot work operations	with metals				
PROC 26	Handling of solid inorganic subst temperature	ances at ambient				
PROC 27a	· · · · ·	Production of metal powders (hot processes)				
PROC 27b	Production of metal powders (wet processes)					
ERC 1-7, 12	Manufacture, formulation and all uses	types of industrial				
ERC 10, 11	Wide-dispersive outdoor and indo articles and materi					
2.1 Control of work						
Product characteristic						
is reflected by an assignr at ambient temperature th temperature based, takin	approach, the substance-intrinsic e nent of a so-called fugacity class in he fugacity is based on the dustines g into account the process tempera on the level of abrasion instead of	the MEASE tool. For s of that substance ture and the melting the substance intrin	or operations conducte . Whereas in hot metal g point of the substance	d with solid substances operations, fugacity is		
PROC	Use in preparation	Content in preparation	Physical form	Emission potential		
PROC 22, 23, 25, 27a	not restricted		solid/powder, molten	high		
PROC 24	not restricted		solid/powder	high		
All other applicable PROCs	not restricted		solid/powder	medium		
Amounts used						
combination of the scale of	dled per shift is not considered to of operation (industrial vs. profession of the process intrinsic emission pote	al) and level of cont				
Frequency and duration	n of use/exposure					
PROC		Duration of ex	posure			
PROC 7, 17, 18, 19, 22	≤ 240 minutes					
All other applicable		480 minutes (not restricted)				
PROCs						
PROCs	enced by risk management					
PROCs Human factors not influ	ne during all process steps reflected	in the PROCs is as	sumed to be 10 m³/shi	ift (8 hours).		
PROCs Human factors not influ The shift breathing volum Other given operational	e during all process steps reflected	oosure				
PROCs Human factors not influ The shift breathing volum Other given operational Operational conditions lik assessment of the condu exposure assessment in temperatures are expected	e during all process steps reflected	posure pressure are not c ith considerably hig tio of process temp hest ratio was take	onsidered relevant for h temperatures (i.e. PF erature and melting po n as a worst case assu	occupational exposure ROC 22, 23, 25), the bint. As the associated imption for the		
PROCs Human factors not influ The shift breathing volum Other given operational Operational conditions lik assessment of the condu exposure assessment in temperatures are expected exposure estimation. Thu PROC 25.	te during all process steps reflected I conditions affecting workers ex te process temperature and process icted processes. In process steps w MEASE is however based on the ra ted to vary within the industry the hig	s pressure are not c ith considerably hig tio of process temp hest ratio was take matically covered in	onsidered relevant for h temperatures (i.e. PF erature and melting po n as a worst case assu n this exposure scenar	occupational exposure ROC 22, 23, 25), the bint. As the associated imption for the		
PROCs Human factors not influ The shift breathing volum Other given operational Operational conditions lik assessment of the condu exposure assessment in temperatures are expected exposure estimation. Thu PROC 25.	the during all process steps reflected I conditions affecting workers ex the process temperature and process cted processes. In process steps w MEASE is however based on the ra- ted to vary within the industry the hig is all process temperatures are autor ind measures at process level (so ures at the process level (e.g. conta	pressure are not c ith considerably hig tio of process temp hest ratio was take matically covered in urce) to prevent re	onsidered relevant for h temperatures (i.e. PF erature and melting po n as a worst case assu n this exposure scenar	occupational exposure ROC 22, 23, 25), the bint. As the associated imption for the io for PROC 22, 23 and		
PROCs Human factors not influ The shift breathing volum Other given operational Operational conditions lik assessment of the condu exposure assessment in temperatures are expected exposure estimation. Thu PROC 25. Technical conditions ar Risk management measurequired in the processes	the during all process steps reflected I conditions affecting workers ex the process temperature and process cted processes. In process steps w MEASE is however based on the ra- ted to vary within the industry the hig is all process temperatures are autor ind measures at process level (so ures at the process level (e.g. conta	pressure are not c ith considerably hig tio of process temp hest ratio was take matically covered in urce) to prevent re imment or segregati	onsidered relevant for h temperatures (i.e. PF erature and melting po n as a worst case assu n this exposure scenar lease on of the emission sou	occupational exposure ROC 22, 23, 25), the bint. As the associated imption for the io for PROC 22, 23 and		
PROCs Human factors not influ The shift breathing volum Other given operational Operational conditions lik assessment of the condu exposure assessment in temperatures are expected exposure estimation. Thu PROC 25. Technical conditions ar Risk management measurequired in the processes	The during all process steps reflected I conditions affecting workers ex- the process temperature and process incted processes. In process steps we MEASE is however based on the ra- ed to vary within the industry the high is all process temperatures are autor and measures at process level (sour- process level (e.g. contants) and measures to control dispersion Level of separation	pressure are not c ith considerably hig tio of process temp hest ratio was take matically covered in urce) to prevent re imment or segregati	onsidered relevant for h temperatures (i.e. PF erature and melting po n as a worst case assu n this exposure scenar lease on of the emission sou	occupational exposure ROC 22, 23, 25), the bint. As the associated imption for the io for PROC 22, 23 and		
PROCs Human factors not influ The shift breathing volum Other given operational Operational conditions lik assessment of the condu exposure assessment in temperatures are expecte exposure estimation. Thu PROC 25. Technical conditions ar Risk management measu required in the processes Technical conditions ar	The during all process steps reflected I conditions affecting workers ex- the process temperature and process incted processes. In process steps we MEASE is however based on the ra- ed to vary within the industry the high is all process temperatures are autor and measures at process level (solid and measures to control dispersion Level of separation Any potentially required	s pressure are not c ith considerably hig tio of process temp hest ratio was take omatically covered in urce) to prevent re inment or segregation from source tow Localised	onsidered relevant for h temperatures (i.e. PF erature and melting po n as a worst case assu n this exposure scenar lease on of the emission sou ards the worker Efficiency of LC (according to	occupational exposure ROC 22, 23, 25), the pint. As the associated imption for the io for PROC 22, 23 and rce) are generally not		
PROCs Human factors not influ The shift breathing volum Other given operational Operational conditions lik assessment of the condu exposure assessment in temperatures are expected exposure estimation. Thu PROC 25. Technical conditions ar Risk management measurequired in the processes Technical conditions ar PROC	The during all process steps reflected I conditions affecting workers ex- te process temperature and process toted processes. In process steps we MEASE is however based on the ra- ed to vary within the industry the high is all process temperatures are autor and measures at process level (solution) are at the process level (e.g. contants) and measures to control dispersion Level of separation Any potentially required separation of workers from the emission source is indicated	s pressure are not c ith considerably hig tio of process temp hest ratio was take matically covered in urce) to prevent re inment or segregati n from source tow Localised controls (LC)	onsidered relevant for h temperatures (i.e. PF erature and melting po n as a worst case assu n this exposure scenar lease on of the emission sou ards the worker Efficiency of LC (according to MEASE)	occupational exposure ROC 22, 23, 25), the pint. As the associated imption for the io for PROC 22, 23 and rce) are generally not		
PROCs Human factors not influ The shift breathing volum Other given operational Operational conditions lik assessment of the condu exposure assessment in temperatures are expected exposure estimation. Thu PROC 25. Technical conditions ar Risk management measurequired in the processes Technical conditions ar PROC PROC 1, 2, 15, 27b	The during all process steps reflected I conditions affecting workers ex- the process temperature and process incted processes. In process steps we MEASE is however based on the ra- ed to vary within the industry the high is all process temperatures are autor ind measures at process level (sourcess) ind measures to control dispersion Level of separation Any potentially required separation of workers from the	s pressure are not c ith considerably hig tio of process temp hest ratio was take matically covered in arce) to prevent re inment or segregati th from source tow Localised controls (LC) not required general	onsidered relevant for h temperatures (i.e. PF erature and melting po n as a worst case assu n this exposure scenar lease on of the emission sou ards the worker Efficiency of LC (according to MEASE) na	occupational exposure ROC 22, 23, 25), the pint. As the associated imption for the io for PROC 22, 23 and rce) are generally not		



PRODUCT SAFETY DATA SHEET for Ca(OH)2

prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

	(positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.			
Organisational measure	s to prevent /limit releases, disp	ersion and exposu	ıre	
These measures involve eating and smoking at the	on. General occupational hygiene r good personal and housekeeping workplace, the wearing of standard d of work shift. Do not wear contam	practices (i.e. regul working clothes and	ar cleaning with suitab d shoes unless otherwis	le cleaning devices), no se stated below. Shower
Conditions and measure	es related to personal protection	, hygiene and hea	Ith evaluation	
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 4, 5, 7, 8a, 8b, 9, 10, 16, 17, 18, 19, 22, 24, 27a	FFP1 mask	APF=4		Eye protection equipment (e.g. goggles or visors)
All other applicable PROCs	not required	na	Since calcium dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	must be worn, unless potential contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.
shall be considered that the For reasons as given abo the use of RPE), (ii) have hair). The recommended the contours of the face p The employer and self-en devices and the managen policy for a respiratory pro-	mass of the RPE itself, due to the in the worker's capability of using tools we, the worker should therefore be suitable facial characteristics reduc devices above which rely on a tight roperly and securely. Inployed persons have legal respon- ment of their correct use in the work totective device programme includin of different RPE (according to BS E	and of communica (i) healthy (especia cing leakages betwo face seal will not p sibilities for the mai cplace. Therefore, the g training of the wo	ating are reduced during illy in view of medical p een face and mask (in provide the required pro ntenance and issue of ney should define and o rkers.	g the wearing of RPE. roblems that may affect view of scars and facial tection unless they fit respiratory protective document a suitable
	onmental exposure	11 323.2003) can b	e found in the glossary	OF MEAGE.
Amounts used	•			
The daily and annual am exposure.	nount per site (for point sources)	is not considered t	o be the main determ	inant for environmental
Frequency and duration	of use			
Intermittent (< 12 time per	r year) or continuous use/release			
Environment factors no	t influenced by risk management			
Flow rate of receiving sur	face water: 18000 m ³ /day			
Other given operational	conditions affecting environmer	ntal exposure		
Effluent discharge rate: 20	000 m³/day			
	ons and measures to reduce or			
to surface water, in case s during introduction into op receiving surface waters a values in the range of 6-9	res related to the environment aim such discharges are expected to ca ben waters is required. In general d are minimised (e.g. through neutral . This is also reflected in the descri anagement measure can be found	ause significant pH ischarges should be isation). In general ption of standard O	changes. Regular contr e carried out such that most aquatic organism ECD tests with aquatic	rol of the pH value pH changes in s can tolerate pH



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Conditions and measures related to waste

Solid industrial waste of lime should be reused or discharged to the industrial wastewater and further neutralized if needed.

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium dihydroxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

401.				r
PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	MEASE	< 1 mg/m³ (0.01 – 0.88)	irritating to skin, dern minimised as far as DNEL for dermal e derived. Thus, der	Iroxide is classified as nal exposure has to be technically feasible. A effects has not been rmal exposure is not exposure scenario.
Environmental emission	าร			
STPs/WWTPs, as emissi (waste) water. The aquati changes related to OH- d effect. Only the local scal- treatment plants (WWTPs expected to take place or dihydroxide will be found vapour pressure of calciu either for this exposure so possible pH changes in S	ure assessment is only relevant for ons of calcium dihydroxide in the di c effect and risk assessment only c ischarges, being the toxicity of Ca2 e is being addressed, including mu s) when applicable, both for product a local scale. The high water solut predominantly in water. Significant m dihydroxide. Significant emission cenario. The exposure assessment TP effluent and surface water related by assessing the resulting pH im The production of calcium dihydroxide of the pH is not neutralised, the discl impact the pH in the receiving wat	fferent life-cycle sta leal with the effect of + is expected to be nicipal sewage treat tion and industrial u bility and very low v emissions or exposi- s or exposure to the for the aquatic envi- ed to the OH- disch pact: the surface wa xide can potentially concentration and a harge of effluent froi er. The pH of efflue	ges (production and us on organisms/ecosyster negligible compared to ment plants (STPs) or se as any effects that r apour pressure indicate ure to air are not exper e terrestrial environmer ronment will therefore arges at the local scale atter pH should not incre result in an aquatic en ffect the pH in the aqua m calcium dihydroxide nts is normally measur	se) mainly apply to ms due to possible pH o the (potential) pH industrial waste water night occur would be e that calcium cted due to the low of are not expected only deal with the ease above 9. hission and locally atic environment. When production sites may
Exposure concentration in waste water treatment plant (WWTP)	can be neutralised easily as often Waste water from calcium dihydro there is no biological treatment. Th production sites will normally not b but can be used for pH control of a	ixide production is a herefore, wastewate be treated in biologic	n inorganic wastewate or streams from calciun cal waste water treatme	n dihydroxide ent plants (WWTPs),
Exposure concentration in aquatic pelagic compartment	When calcium dihydroxide is emitt will be negligible. When lime is rej buffer capacity of the water. The h will be. In general the buffer capac regulated by the equilibrium betwe carbonate ion (CO32–).	ected to surface wa higher the buffer cap city preventing shifts	ter, the pH may increase bacity of the water, the s in acidity or alkalinity	se, depending on the lower the effect on pH in natural waters is
Exposure concentration in sediments	The sediment compartment is not calcium dihydroxide: when calciun to sediment particles is negligible.			
Exposure concentrations in soil and groundwater	The terrestrial compartment is not to be relevant.	•		
Exposure concentration in atmospheric compartment	The air compartment is not include dihydroxide: when emitted to air a result of its reaction with CO2 (or calcium(bi)carbonate) are washed neutralised calcium dihydroxide la	s an aerosol in wate other acids), into H0 I out from the air and	er, calcium dihydroxide CO3- and Ca2+. Subse d thus the atmospheric	is neutralised as a equently, the salts (e.g.
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is n secondary poisoning is therefore r		um dihydroxide: a risk	assessment for



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Occupational exposure

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. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustinesy.

DNEL_{inhalation}: 1 mg/m³ (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

Environmental exposure

If a site does not comply with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to perform a more site-specific assessment. For that assessment, the following stepwise approach is recommended.

Tier 1: retrieve information on effluent pH and the contribution of the calcium dihydroxide on the resulting pH. Should the pH be above 9 and be predominantly attributable to lime, then further actions are required to demonstrate safe use.

Tier 2a: retrieve information on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the value of 9. If the measures are not available, the pH in the river can be calculated as follows:

$$pHriver = Log \left[\frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent} \right]$$

$$Eq 1)$$

Where:

Q effluent refers to the effluent flow (in m3/day)

Q river upstream refers to the upstream river flow (in m³/day)

pH effluent refers to the pH of the effluent

pH upstream river refers to the pH of the river upstream of the discharge point

Please note that initially, default values can be used:

- Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000 m³/day
- Q effluent: use default value of 2000 m³/day
- The upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this can be justified.

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

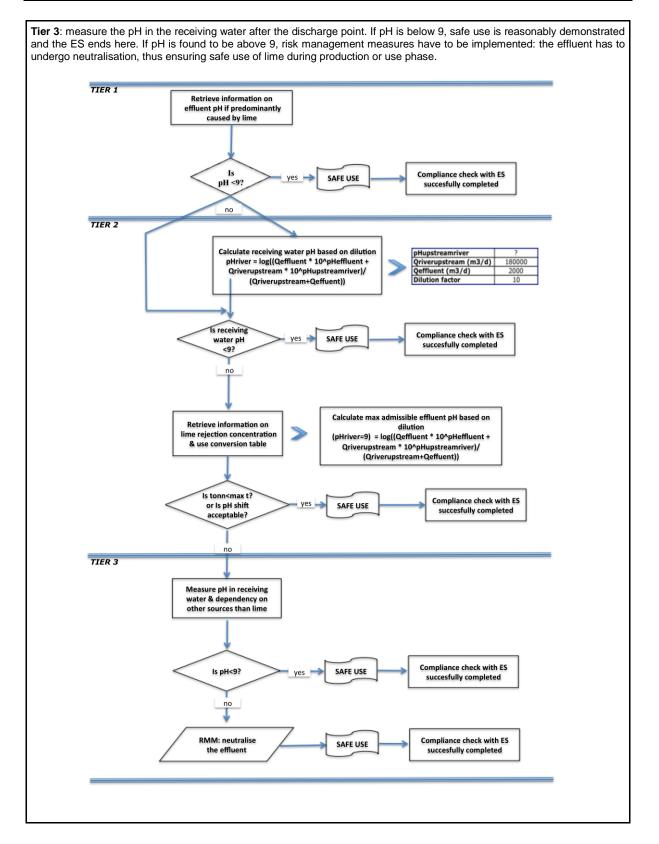
Tier 2b: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium dihydroxide.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010





prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.4: Manufacture and industrial uses of high dusty solids/powders of lime substances

Exposure Scenario	Format (1) addressing uses carried out	by workers		
1. Title				
Free short title	Manufacture and industrial uses of high dus	ty solids/powders of lime substances		
Systematic title based on use descriptor	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14, SU15, SU16, SU17, SU18, SU19, SU20, SU23, SU24 PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC38, PC39, PC40 AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13 (appropriate PROCs and ERCs are given in Section 2 below)			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered	d are described in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is based	on the exposure estimation tool MEASE.		
2. Operational cond	ditions and risk management measures			
PROC/ERC	REACH definition	Involved tasks		
PROC 1	Use in closed process, no likelihood of exposure			
PROC 2	Use in closed, continuous process with occasional controlled exposure			
PROC 3	Use in closed batch process (synthesis or formulation)			
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises			
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)			
PROC 7	Industrial spraying			
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities			
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities			
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA Guidance on information requirements and		
PROC 10	Roller application or brushing	chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-		
PROC 13	Treatment of articles by dipping and pouring	EN).		
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation			
PROC 15	Use as laboratory reagent			
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected			
PROC 17	Lubrication at high energy conditions and in partly open process			
PROC 18	Greasing at high energy conditions			
PROC 19	Hand-mixing with intimate contact and only PPE available			
PROC 22	Potentially closed processing operations with minerals/metals at elevated temperature Industrial setting			
PROC 23	Open processing and transfer operations with minerals/metals at elevated temperature			
PROC 24	High (mechanical) energy work-up of substances bound in materials and/or articles			



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

			1	
PROC 25	Other hot work operations			
PROC 26	Handling of solid inorganic substa temperature	ances at ambient		
PROC 27a	Production of metal powders (h	not processes)		
PROC 27b	Production of metal powders (v	wet processes)		
ERC 1-7, 12	Manufacture, formulation and all t uses	types of industrial		
ERC 10, 11	Wide-dispersive outdoor and indo articles and materia			
2.1 Control of work	ers exposure			
Product characteristic				
is reflected by an assignn at ambient temperature th temperature based, taking	approach, the substance-intrinsic e nent of a so-called fugacity class in he fugacity is based on the dustines g into account the process temperat on the level of abrasion instead of t	the MEASE tool. For s of that substance ture and the melting the substance intrin	or operations conducte . Whereas in hot metal g point of the substanc	d with solid substances operations, fugacity is e. As a third group, high
PROC	Use in preparation	Content in preparation	Physical form	Emission potential
PROC 22, 23, 25, 27a	not restricted		solid/powder, molten	high
All other applicable PROCs	not restricted		solid/powder	high
Amounts used				
combination of the scale	led per shift is not considered to infl of operation (industrial vs. professio minant of the process intrinsic emiss	nal) and level of co		
Frequency and duration	of use/exposure			
PROC		Duration of ex	posure	
PROC 7, 8a, 17, 18, 19, 22	≤ 240 minutes			
All other applicable PROCs	480 minutes (not restricted)			
Human factors not influ	enced by risk management			
The shift breathing volum	e during all process steps reflected	in the PROCs is as	sumed to be 10 m³/sh	ift (8 hours).
Other given operational	conditions affecting workers exp	oosure		
assessment of the condu exposure assessment in temperatures are expected	e process temperature and process cted processes. In process steps wi MEASE is however based on the ra ed to vary within the industry the hig is all process temperatures are auto	th considerably hig tio of process temp hest ratio was take	h temperatures (i.e. Pf erature and melting po n as a worst case assu	ROC 22, 23, 25), the pint. As the associated imption for the
	nd measures at process level (sou	urce) to prevent re	lease	
	ures at the process level (e.g. contai	· · ·		rce) are generally not



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information
PROC 1	Any potentially required separation of workers from the	not required	na	-
PROC 2, 3	emission source is indicated above under "Frequency and duration of exposure". A	general ventilation	17 %	-
PROC 7	reduction of exposure 1 A reduction of exposure duration can be achieved, for example, by the installation of ventilated	integrated local exhaust ventilation	84 %	-
PROC 19	(positive pressure) control rooms or by removing the worker from	not applicable	na	-
All other applicable PROCs	workplaces involved with relevant exposure.	local exhaust ventilation	78 %	-
Avoid inhalation or ingest substance. These measu devices), no eating and s	es to prevent /limit releases, dispu- tion. General occupational hygiene is tres involve good personal and hous moking at the workplace, the wearing ge clothes at end of work shift. Do n	measures are requ sekeeping practices ng of standard work	ired to ensure a safe has s (i.e. regular cleaning v king clothes and shoes	with suitable cleaning unless otherwise state
compressed air.	es related to personal protection	hygiene and bea	Ith evaluation	
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 1, 2, 3, 23, 25, 27b	not required	na	- Since calcium	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally face protection, protective clothing and safety shoes are required to be worn as appropriate.
PROC 4, 5, 7, 8a, 8b, 9, 17, 18,	FFP2 mask	APF=10		
PROC 10, 13, 14, 15, 16, 22, 24, 26, 27a	FFP1 mask	APF=4	dihydroxide is classified as	
PROC 19	FFP3 mask // we shall only be worn if the following	APF=20	irritating to skin, the use of protective gloves is mandatory for all process steps.	
(compare with "duration of breathing resistance and shall be considered that t For reasons as given abo the use of RPE), (ii) have hair). The recommended the contours of the face p The employer and self-er devices and the manager policy for a respiratory pri An overview of the APFs	of exposure ⁷ above) should reflect the mass of the RPE itself, due to the in he worker's capability of using tools ove, the worker should therefore be suitable facial characteristics reduce devices above which rely on a tight properly and securely. Inployed persons have legal response ment of their correct use in the work otective device programme includin of different RPE (according to BS E	he additional physic ncreased thermal s and of communica (i) healthy (especia cing leakages betw face seal will not p sibilities for the mai place. Therefore, tl g training of the wo	blogical stress for the w tress by enclosing the lating are reduced during ally in view of medical p een face and mask (in provide the required pro intenance and issue of hey should define and o provers.	orker due to the head. In addition, it g the wearing of RPE. roblems that may affec view of scars and facia tection unless they fit respiratory protective document a suitable
	ronmental exposure			
Amounts used		in not considered t	to be the main determ	inant for environment
The daily and annual an exposure.	nount per site (for point sources) i			



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Environment factors not influenced by risk management

Flow rate of receiving surface water: 18000 m³/day

Other given operational conditions affecting environmental exposure

Effluent discharge rate: 2000 m³/day

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

Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.

Conditions and measures related to waste

Solid industrial waste of lime should be reused or discharged to the industrial wastewater and further neutralized if needed.

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium dihydroxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	MEASE	<1 mg/m³ (0.01 – 0.96)	irritating to skin, dern minimised as far as DNEL for dermal e derived. Thus, der	roxide is classified as nal exposure has to be technically feasible. A effects has not been rmal exposure is not exposure scenario.

Environmental emissions

The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions of calcium dihydroxide in the different life-cycle stages (production and use) mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, being the toxicity of Ca2+ is expected to be negligible compared to the (potential) pH effect. Only the local scale is being addressed, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, both for production and industrial use as any effects that might occur would be expected to take place on a local scale. The high water solubility and very low vapour pressure indicate that calcium dihydroxide will be found predominantly in water. Significant emissions or exposure to at a re not expected due to the low vapour pressure of calcium dihydroxide. Significant emissions or exposure to the terrestrial environment are not expected either for this exposure scenario. The exposure assessment for the aquatic environment will therefore only deal with the possible pH changes in STP effluent and surface water related to the OH- discharges at the local scale. The exposure assessment is approached by assessing the resulting pH impact: the surface water pH should not increase above 9.

accessinent is appreading	assessment is approached by assessing the resulting priningade, the sundoe water princhouse increase above of			
Environmental emissions	The production of calcium dihydroxide can potentially result in an aquatic emission and locally increase the calcium dihydroxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium dihydroxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.			
Exposure	Waste water from calcium dihydroxide production is an inorganic wastewater stream and therefore			
concentration in	there is no biological treatment. Therefore, wastewater streams from calcium dihydroxide			
waste water treatment	production sites will normally not be treated in biological waste water treatment plants (WWTPs),			
plant (WWTP)	but can be used for pH control of acid wastewater streams that are treated in biological WWTPs.			
Exposure concentration in aquatic pelagic compartment	When calcium dihydroxide is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion (CO32-).			



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Exposure concentration in sediments	The sediment compartment is not included in this ES, because it is not considered relevant for calcium dihydroxide: when calcium dihydroxide is emitted to the aquatic compartment, sorption of to sediment particles is negligible.		
Exposure concentrations in soil and groundwater	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.		
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for calcium dihydroxide: when emitted to air as an aerosol in water, calcium dihydroxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium dihydroxide largely end up in soil and water.		
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for calcium dihydroxide: a risk assessment for secondary poisoning is therefore not required.		
4. Guidance to DU	to evaluate whether he works inside the boundaries set by the ES		
Occupational exposure			
met or the downstream u measures are adequate. the respective DNEL (giv below. If measured data (www.ebrc.de/mease.htm according to the MEASE Method (RDM) are define	boundaries set by the ES if either the proposed risk management measures as described above are ser can demonstrate on his own that his operational conditions and implemented risk management This has to be done by showing that they limit the inhalation and dermal exposure to a level below en that the processes and activities in question are covered by the PROCs listed above) as given are not available, the DU may make use of an appropriate scaling tool such as MEASE all) to estimate the associated exposure. The dustiness of the substance used can be determined glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum et as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" istiness ≥10 % are defined as "high dusty".		
DNELinhalation: 1 m	g/m ³ (as respirable dust)		
Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m ³ . By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).			
Environmental exposu	e		
	with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to ific assessment. For that assessment, the following stepwise approach is recommended.		
	on on effluent pH and the contribution of the calcium dihydroxide on the resulting pH. Should the pH minantly attributable to lime, then further actions are required to demonstrate safe use.		
	ion on receiving water pH after the discharge point. The pH of the receiving water shall not exceed sures are not available, the pH in the river can be calculated as follows:		
$pHriver = Log \frac{Qe}{Qe}$	sures are not available, the pH in the river can be calculated as follows: $\frac{effluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Oriverupstream + Oeffluent}$		
	(<i>Eq</i> 1)		
Where:			
	rs to the effluent flow (in m³/day)		
Q river upstream refers to the upstream river flow (in m³/day)			
pH effluent refers to the pH of the effluent			
pH upstream river refers to the pH of the river upstream of the discharge point			
• Q riv	at initially, default values can be used: ver upstream flows: use the 10th of existing measurements distribution or use default value of 18000		
m³/d			
	fluent: use default value of 2000 m³/day		
can	upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this be justified.		
Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.			

Tier 2b: Equation has to be seen as a worst case scenario, where water conditions are standard and not case specific. Tier 2b: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium dihydroxide.

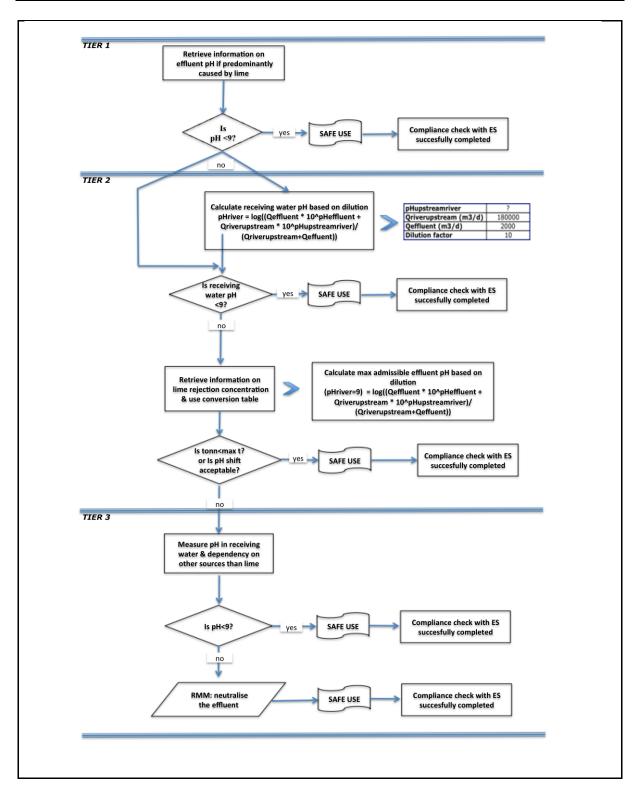
Tier 3: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010





prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.5: Manufacture and industrial uses of massive objects containing lime substances

1. Title					
Free short title	Manufacture and indust	ial uses of massive	objects containing lim	e substances	
	Manufacture and industrial uses of massive objects containing lime substances				
	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14, SU15, SU16, SU17, SU18, SU19, SU20, SU23, SU24				
Systematic title based	PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18,				
on use descriptor	PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33,				
	PC34, PC35, PC36, PC37, PC38, PC39, PC40 AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13				
	(appropriate PROCs and ERCs are given in Section 2 below)				
Processes, tasks and/or activities	Processes, tasks and/or activities covered are described in Section 2 below.				
covered			a are described in Sect		
Assessment Method	The assessment of inhalation	exposure is based	l on the exposure estim	ation tool MEASE.	
2. Operational con	ditions and risk manageme	ent measures			
PROC/ERC	REACH definitio	n	Involv	ed tasks	
PROC 6	Calendering operati	ons	-		
PROC 14	Production of preparations or artic compression, extrusion, pe				
PROC 21	Low energy manipulation of subs				
	materials and/or arti				
PROC 22	Potentially closed processing operations with minerals/metals at elevated temperature		Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12 Use descriptor system (ECHA-2010-G-05- EN).		
	Industrial setting				
PROC 23	Open processing and transfer operations with				
	minerals/metals at elevated temperature High (mechanical) energy work-up of substances				
PROC 24	bound in materials and/or articles				
PROC 25	Other hot work operations with metals				
ERC 1-7, 12	Manufacture, formulation and all types of industrial		1		
	USES Wide-dispersive outdoor and indo	or use of long-life	4		
ERC 10, 11	Wide-dispersive outdoor and indoor use of long-life articles and materials				
2.1 Control of wor	kers exposure				
Product characteristic					
	approach, the substance-intrinsic e				
	ment of a so-called fugacity class in				
temperature based, takir	he fugacity is based on the dustines ig into account the process tempera	ture and the meltin	g point of the substanc	e. As a third group, hi	
abrasive tasks are based	on the level of abrasion instead of	the substance intrir	sic emission potential.		
PROC	Use in preparation	Content in preparation	Physical form	Emission potentia	
PROC 22, 23,25	not restricted		massive objects, molten	high	
PROC 24	not restricted		massive objects	high	
All other applicable PROCs	not restricted		massive objects	very low	
Amounts used					



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Frequency and duratio	Frequency and duration of use/exposure					
PROC		Duration of ex	posure			
PROC 22		≤ 240 minu	ites			
All other applicable PROCs		480 minutes (not	restricted)			
Human factors not infl	uenced by risk management					
The shift breathing volur	ne during all process steps reflected	in the PROCs is as	ssumed to be 10 m ³ /sh	ift (8 hours).		
Other given operationa	I conditions affecting workers ex	posure				
Operational conditions like process temperature and process pressure are not considered relevant for occupational exposure assessment of the conducted processes. In process steps with considerably high temperatures (i.e. PROC 22, 23, 25), the exposure assessment in MEASE is however based on the ratio of process temperature and melting point. As the associated temperatures are expected to vary within the industry the highest ratio was taken as a worst case assumption for the exposure estimation. Thus all process temperatures are automatically covered in this exposure scenario for PROC 22, 23 and PROC 25.						
Technical conditions a	nd measures at process level (so	urce) to prevent re	lease			
Risk management meas required in the processe	sures at the process level (e.g. cont s.	ainment or segrega	tion of the emission so	ource) are generally not		
Technical conditions a	nd measures to control dispersio	n from source tow	ards the worker			
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information		
PROC 6, 14, 21	Any potentially required separation of workers from the	not required	na	-		
PROC 22, 23, 24, 25	emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	local exhaust ventilation	78 %	-		
Organisational measures to prevent /limit releases, dispersion and exposure						
substance. These measi devices), no eating and s	tion. General occupational hygiene ures involve good personal and hous smoking at the workplace, the wearin nge clothes at end of work shift. Do r	sekeeping practices ng of standard work	i.e. regular cleaning v ing clothes and shoes	with suitable cleaning unless otherwise stated		



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Protective equipment (RPE) protection factor, APE) gloves equipment (PPE) PROC 22 FFP1 mask APF=4 Since calcium dihydroxide is classified as potential contact with the eye can be excluded by the matter and type of application (i.e. closed process). Additionally, for all process steps. The addition of application (i.e. closed process). Additionally, face protection, application (i.e. closed process). Additionally, face protection, required to be worn as application of exposure above, bhould reflect the additional physiological stress for the worker due to the breaching resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the warding of RPE. For reasons as given above, the worker should therfore be (i) healthy (espically in view of medical problems that may affect the use of RPE), (ii) have subtel facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required problems that may affect the contours of the face properly and securely. The enployer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE. 2.2 Control of environmental exposure For reasons as different RPE (according to BS EN 529:2005) can be found in the defines and document a suitable paper and the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE. 2.2 Control of environm	Conditions and measures related to personal protection, hygiene and health evaluation					
PROC 22 FFP1 mask APF=4 Since calcium dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps. equipment (e.g., googles or visors) potential contact with the eye can be excluded by the nature and type of application (i.e. closed pipcation (i.	PROC		(assigned protection		protective	
All other applicable PROCs not required irritiating to skin, the gloves is mandatory for all process, steps, and the protective gloves is mandatory for all process, and the protective gloves is mandatory for all process, and the protective appropriate. nature and fype of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate. Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as gliven above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face programme including training of the workers. An overview of the APPs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE. 2.2 Control of environmental exposure Image: Ima	PROC 22	FFP1 mask	APF=4	dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory	equipment (e.g. goggles or visors) must be worn, unless potential contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.	
(compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. 2.2 Control of environmental exposure Amounts used The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental exposure. Frequency and duration of use Intermittent (< 12 time per year) or continuous use/release Environment factors not influenced by risk management Flow rate of receiving surface water: 18000 m³/day Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expolated occore significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges shoul	All other applicable PROCs					
Amounts used The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental exposure. Frequency and duration of use Intermittent (< 12 time per year) or continuous use/release	(compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.					
The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental exposure. Frequency and duration of use Intermittent (< 12 time per year) or continuous use/release Environment factors not influenced by risk management Flow rate of receiving surface water: 18000 m³/day Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measures can be found in the introduction section. Conditions and measures related to waste	2.2 Control of environmental exposure					
exposure. Frequency and duration of use Intermittent (< 12 time per year) or continuous use/release						
Intermittent (< 12 time per year) or continuous use/release Environment factors not influenced by risk management Flow rate of receiving surface water: 18000 m³/day Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste	The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental exposure.					
Environment factors not influenced by risk management Flow rate of receiving surface water: 18000 m³/day Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste	Frequency and duration of use					
Flow rate of receiving surface water: 18000 m³/day Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste	Intermittent (< 12 time per year) or continuous use/release					
Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m³/day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste	Environment factors no	ot influenced by risk management	t			
Effluent discharge rate: 2000 m ³ /day Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste	Flow rate of receiving sur	rface water: 18000 m³/day				
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section. Conditions and measures related to waste	Other given operational conditions affecting environmental exposure					
Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.	Effluent discharge rate: 2000 m³/day					
to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.	Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil					
	Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.					
Solid industrial waste of lime should be reused or discharged to the industrial wastewater and further neutralized if needed.	Conditions and measures related to waste					



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium dihydroxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

481.				
PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 6, 14, 21, 22, 23, 24, 25	MEASE	< 1 mg/m³ (0.01 - 0.44)	irritating to skin, derr minimised as far as DNEL for dermal derived. Thus, der	froxide is classified as nal exposure has to be technically feasible. A effects has not been rmal exposure is not exposure scenario.
Environmental emissio	ns			
STPs/WWTPs, as emissi (waste) water. The aquat changes related to OH- of effect. Only the local sca treatment plants (WWTP expected to take place of dihydroxide will be found vapour pressure of calciu either for this exposure is possible pH changes in S	sure assessment is only relevant for ions of calcium dihydroxide in the d tic effect and risk assessment only of discharges, being the toxicity of Ca2 le is being addressed, including mu s) when applicable, both for produc n a local scale. The high water solu predominantly in water. Significant um dihydroxide. Significant emissior cenario. The exposure assessment STP effluent and surface water related by assessing the resulting pH im The production of calcium dihydro increase the calcium dihydroxide of the pH is not neutralised, the disch impact the pH in the receiving wat	ifferent life-cycle sta deal with the effect of the sexpected to be nicipal sewage treat tion and industrial u bility and very low v emissions or expose to or exposure to the for the aquatic envi- ed to the OH- disch pact: the surface wa xide can potentially concentration and al harge of effluent from	ages (production and us on organisms/ecosyste negligible compared to timent plants (STPs) or se as any effects that r apour pressure indicate to air are not expe- te terrestrial environment ronment will therefore arges at the local scale ater pH should not increa- result in an aquatic em ffect the pH in the aqua n calcium dihydroxide	se) mainly apply to ms due to possible pH o the (potential) pH industrial waste water might occur would be e that calcium cted due to the low nt are not expected only deal with the e. The exposure ease above 9. hission and locally atic environment. When production sites may
Exposure	can be neutralised easily as often Waste water from calcium dihydro	required by nationa xide production is a	l laws. n inorganic wastewate	r stream and therefore
concentration in waste water treatment plant (WWTP)	there is no biological treatment. Th production sites will normally not b but can be used for pH control of a	nerefore, wastewate be treated in biologic	r streams from calcium cal waste water treatme	n dihydroxide ent plants (WWTPs),
Exposure concentration in aquatic pelagic compartment	When calcium dihydroxide is emitti will be negligible. When lime is rej buffer capacity of the water. The h will be. In general the buffer capaci regulated by the equilibrium betwee carbonate ion (CO32-).	ected to surface wa igher the buffer cap city preventing shifts een carbon dioxide (ter, the pH may increas acity of the water, the l in acidity or alkalinity in CO2), the bicarbonate	se, depending on the lower the effect on pH in natural waters is ion (HCO3-) and the
Exposure concentration in sediments	The sediment compartment is not calcium dihydroxide: when calciun sediment particles is negligible.			
Exposure concentrations in soil and groundwater	The terrestrial compartment is not to be relevant.	included in this exp	osure scenario, becau	se it is not considered
Exposure concentration in atmospheric compartment	The air compartment is not include dihydroxide: when emitted to air a result of its reaction with CO2 (or o calcium(bi)carbonate) are washed neutralised calcium dihydroxide la	s an aerosol in wate other acids), into HC out from the air and	er, calcium dihydroxide CO3- and Ca2+. Subse d thus the atmospheric	is neutralised as a quently, the salts (e.g.
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is n secondary poisoning is therefore r		um dihydroxide: a risk a	assessment for



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Occupational exposure

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. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness ×10 % are defined as "high dusty".

DNEL_{inhalation}: 1 mg/m³ (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

Environmental exposure

If a site does not comply with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to perform a more site-specific assessment. For that assessment, the following stepwise approach is recommended.

Tier 1: retrieve information on effluent pH and the contribution of the calcium dihydroxide on the resulting pH. Should the pH be above 9 and be predominantly attributable to lime, then further actions are required to demonstrate safe use.

Tier 2a: retrieve information on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the value of 9. If the measures are not available, the pH in the river can be calculated as follows:

$$pHriver = Log \left[\frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent} \right]$$
(Eq 1)

Where:

Q effluent refers to the effluent flow (in m³/day)

Q river upstream refers to the upstream river flow (in m³/day)

pH effluent refers to the pH of the effluent

pH upstream river refers to the pH of the river upstream of the discharge point

Please note that initially, default values can be used:

- Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000 m³/day
- Q effluent: use default value of 2000 m³/day
- The upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this can be justified.

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

Tier 2b: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium dihydroxide.

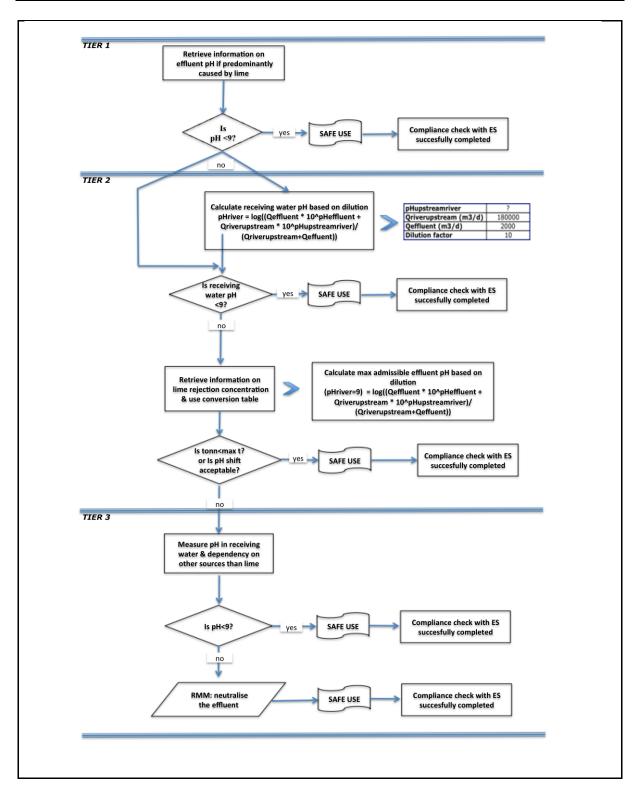
Tier 3: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010





prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.6: Professional uses of aqueous solutions of lime substances

Exposure Scenario	Format (1) addressing uses carrie	ed out by workers	
1. Title			
Free short title	Professional uses of aq	ueous solutions of lime substances	
Systematic title based on use descriptor	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23, SU24 PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC39, PC40 AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13 (appropriate PROCs and ERCs are given in Section 2 below)		
Processes, tasks and/or activities covered	Processes, tasks and/or activities	s covered are described in Section 2 below.	
Assessment Method		based on the exposure estimation tool MEASE. The nent is based on FOCUS-Exposit.	
2. Operational conc	litions and risk management meas	sures	
PROC/ERC	REACH definition	Involved tasks	
PROC 2	Use in closed, continuous process with occasional controlled exposure		
PROC 3	Use in closed batch process (synthesis or formulation)		
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises		
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)		
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities		
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor	
PROC 10	Roller application or brushing	system (ECHA-2010-G-05-EN).	
PROC 11	Non industrial spraying		
PROC 12	Use of blowing agents in manufacture of foam		
PROC 13	Treatment of articles by dipping and pouring		
PROC 15	Use as laboratory reagent		
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected		
PROC 17	Lubrication at high energy conditions and in partly open process		
PROC 18	Greasing at high energy conditions		
PROC 19	Hand-mixing with intimate contact and only PPE available		
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems	Calcium dihydroxide is applied in numerous cases of wide dispersive uses: agricultural, forestry, fish and shrimps farming, soil treatment and environmental protection.	



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

compressed air.

Revision date: September/2010

Product characteristic					
is reflected by an assignm at ambient temperature th temperature based, taking abrasive tasks are based	nent of a so-called fugacity the fugacity is based on the	class in the MEAS dustiness of that su temperature and th stead of the substar	E tool. For operations con ubstance. Whereas in hot we melting point of the sub ince intrinsic emission pote	exposure determinants. Thi ducted with solid substance metal operations, fugacity is stance. As a third group, hig ential. The spraying of	
PROC	Use in preparation	Content in preparation	Physical form	Emission potential	
All applicable PROCs	not restric	cted	aqueous solution	very low	
Amounts used					
combination of the scale of	ed per shift is not conside of operation (industrial vs. ninant of the process intrin	professional) and le	vel of containment/autom		
Frequency and duration	of use/exposure				
PROC		Durat	ion of exposure		
PROC 11		≤	240 minutes		
All other applicable PROCs	480 minutes (not restricted)				
Human factors not influe	enced by risk manageme	ent			
The shift breathing volume	e during all process steps	reflected in the PRC	DCs is assumed to be 10	m³/shift (8 hours).	
Other given operational	conditions affecting wo	rkers exposure			
	are not used in hot-meta considered relevant for o			e.g. process temperature ar ducted processes.	
Technical conditions an	d measures at process I	evel (source) to pr	event release		
Risk management measu required in the processes.	•	e.g. containment or	segregation of the emiss	ion source) are generally n	
Technical conditions an	d measures to control d	ispersion from sou	urce towards the worker		
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information	
PROC 19	Separation of workers from the emission	not applicable	na	-	
All other applicable PROCs	required in the conducted processes.				
Organisational measure	s to prevent /limit releas	es, dispersion and	l exposure		
substance. These measur devices), no eating and sr	moking at the workplace, t	and housekeeping he wearing of stand	practices (i.e. regular clea ard working clothes and s	afe handling of the ning with suitable cleaning hoes unless otherwise state me. Do not blow dust off wit	



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 11	FFP3 mask	APF=20	Since calcium dihydroxide is classified as irritating to skin, the use of protective gloves is	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential
PROC 17	FFP1 mask	APF=4		excluded by the nature and type of application (i.e. closed process).
All other applicable PROCs	not required	na	process steps. protective clothir safety shoes are re be worn as appro	
An overview of the APFs 2.2 Control of envi Product characteristics		g to BS EN 529:200 – only relevan	95) can be found in the glo at for agricultural so	
	Quan	tity of du	st	
		m3 (in mg)		
	120		Wind sp	eed:
	100		- 3.5 m	/a
				/ 5
	80		🔹 - 6 m/s	, 5
		\mathbf{A}	- 6 m/s - 3.5 m	
	60 40			
	60 40 20			
	60 40	3 7	- 3.5 m	/ S 20
	60 40 20	3 7	- 3.5 m	/ S 20
	60 40 20	3 7	- 3.5 m	/s 20 From the



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Amounts used			
Ca(OH)2	2,244 kg/ha		
Frequency and duration	Frequency and duration of use		
1 day/year (one applicati 2,244 kg/ha is not exceed	on per year). Multiple applications during the year are allowed, provided the total yearly amount of ded (CaOH2)		
Environment factors no	t influenced by risk management		
Volume of surface water: Field surface area: 1 ha	300 L/m ²		
	conditions affecting environmental exposure		
Outdoor use of products Soil mixing depth: 20 cm			
Technical conditions an	nd measures at process level (source) to prevent release		
There are no direct release	ses to adjacent surface waters.		
Technical conditions an	nd measures to reduce or limit discharges, air emissions and releases to soil		
Drift should be minimised			
Organizational measure	es to prevent/limit release from site		
	nts for good agricultural practice, agricultural soil should be analysed prior to application of lime and d be adjusted according to the results of the analysis.		
2.2 Control of envir	ronmental exposure – only relevant for soil treatment in civil engineering		
Product characteristics			
	e estimate based on data from dust measurements in air as a function of the distance from application) Quantity of dust per m3 (in mg) ¹²⁰ ¹²¹ ¹²¹ ¹⁵ ²⁰ ¹³ ¹¹ ¹⁵ ²⁰ ¹³ ¹¹ ¹⁵ ²⁰ ¹⁵		
Amounts used	(Figure taken from: Laudet, A. et al., 1999)		
Ca(OH)2	238,208 kg/ha		
Frequency and duration			
	e in a lifetime. Multiple applications during the year are allowed, provided the total yearly amount of		
	t influenced by risk management		
Field surface area: 1 ha	Field surface area: 1 ha		



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Other given operational Outdoor use of products	conditions affecting en	vironmental exposi	ure	
Soil mixing depth: 20 cm				
Technical conditions an	d measures at process	level (source) to pr	event release	
Lime is only applied onto surface waters.	the soil in the technosphe	ere zone before road	construction. There are	no direct releases to adjacent
Technical onsite conditi	ons and measures to re	duce or limit disch	arges, air emissions an	d releases to soil
Drift should be minimised.				
3. Exposure estima	tion and reference	to its source		
Occupational exposure				
(RCR) is the quotient of the 1 to demonstrate a safe us respirable dust) and the respirable dust and t	The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium dihydroxide of 1 mg/m ³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481			
PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19	MEASE	< 1 mg/m³ (<0.001 - 0.6)	skin, dermal exposure h technically feasible. A not been derived. Th	de is classified as irritating to has to be minimised as far as DNEL for dermal effects has us, dermal exposure is not s exposure scenario.
Environmental exposure	e for agricultural soil pro	otection		
guidance on the calculation ground water, surface wat EUSES as it is more apprincluded in the modelling.	The PEC calculation for soil and surface water was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be ncluded in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data: once			ection products for soil, lelling tool is preferred to the as the drift needs to be as further elaborated on the ording to collected data: once
Environmental	See amounts used			
emissions Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultu	ral soil protection		
Exposure concentration in	Substance	PEC (ug/L)	PNEC (ug/L)	RCR
aquatic pelagic compartment	Ca(OH)2	7.48	490	0.015
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3– to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.			
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR
and groundwater	Ca(OH)2	660	1080	0.61
Exposure concentration in atmospheric compartment	This point is not relevant Pa.	. Calcium dihydroxid	de is not volatile. The vap	our pressures is below 10 ^{–5}
Exposure concentration relevant for the food chain (secondary poisoning)		nent. The uses cove	red do not significantly inf	dered to be omnipresent and iluence the distribution of the



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Environmental exposure for soil treatment in civil engineering

The soil treatment in civil engineering scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

,				
Environmental emissions	See amounts used			
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road border scenario			
Exposure concentration in aquatic pelagic compartment	Not relevant for road border scenario			
Exposure concentration in sediments	Not relevant for road border scenario			
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR
concentrations in soil and groundwater	Ca(OH)2	701	1080	0.65
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide is not volatile. The vapour pressures is below 10 ⁻⁵ Pa.			pur pressures is below 10 ⁻⁵
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca2+ and OH-) in the environment.			
Environmental exposure	Environmental exposure for other uses			
 For all other uses, no quantitative environmental exposure assessment is carried because The operational conditions and risk management measures are less stringent than those outlined for agricultural soil protection or soil treatment in civil engineering Lime is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pH-shift in soil, wastewater or surface water 				

Lime is specifically used to release CO2-free breathable air, upon reaction with CO2. Such applications only relates to the air compartment, where the lime properties are exploited

Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

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. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustyr.

DNEL_{inhalation}: 1 mg/m³ (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.7: Professional uses of low dusty solids/powders of lime substances

Exposure Scenari	o Format (1) addressing uses carried out	t by workers	
1. Title			
Free short title	Professional uses of low dusty solids/powders of lime substances		
Systematic title based on use descriptor	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23, SU24 PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC39, PC40 AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13 (appropriate PROCs and ERCs are given in Section 2 below)		
Processes, tasks and/or activities covered	Processes, tasks and/or activities covere	d are described in Section 2 below.	
Assessment Method	The assessment of inhalation exposure is based o environmental assessment is b		
2. Operational cor	ditions and risk management measures		
PROC/ERC	REACH definition	Involved tasks	
PROC 2	Use in closed, continuous process with occasional controlled exposure		
PROC 3	Use in closed batch process (synthesis or formulation)		
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises		
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)		
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities		
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)		
PROC 10	Roller application or brushing	Further information is provided in the ECHA	
PROC 11	Non industrial spraying	Guidance on information requirements and	
PROC 13	Treatment of articles by dipping and pouring	chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-	
PROC 15	Use as laboratory reagent	EN).	
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected		
PROC 17	Lubrication at high energy conditions and in partly open process		
PROC 18	Greasing at high energy conditions		
PROC 19	Hand-mixing with intimate contact and only PPE available		
PROC 21	Low energy manipulation of substances bound in materials and/or articles		
PROC 25	Other hot work operations with metals		
PROC 26	Handling of solid inorganic substances at ambient temperature		
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems		



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

2.1 Control of wor	kers exposure			
Product characteristic	;			
is reflected by an assigr at ambient temperature temperature based, taki	E approach, the substance-intrinsic iment of a so-called fugacity class in the fugacity is based on the dustine ng into account the process tempera d on the level of abrasion instead of	the MEASE tool. I ss of that substanc ature and the meltin	For operations conduct e. Whereas in hot metang point of the substand	ed with solid substances al operations, fugacity is ce. As a third group, high
PROC	Use in preparation	Content in preparation	Physical form	Emission potential
PROC 25	not restricted		solid/powder, molten	high
All other applicable PROCs	not restricted		solid/powder	low
Amounts used				
combination of the scale	dled per shift is not considered to in e of operation (industrial vs. professi rminant of the process intrinsic emis	onal) and level of c		
Frequency and duration	on of use/exposure			
PROC		Duration of e	xposure	
PROC 17		≤ 240 min	utes	
All other applicable PROCs		480 minutes (no	t restricted)	
Human factors not infl	luenced by risk management			
The shift breathing volu	me during all process steps reflected	d in the PROCs is a	assumed to be 10 m³/s	hift (8 hours).
Other given operation	al conditions affecting workers ex	posure		
temperatures are expectexposure estimation. The PROC 25.	n MEASE is however based on the r ted to vary within the industry the hi nus all process temperatures are aut	ghest ratio was tak omatically covered	en as a worst case ass in this exposure scena	sumption for the
Risk management meas	sures at the process level (e.g. conta			urce) are generally not
required in the processe				
Technical conditions a	and measures to control dispersio		Efficiency of LC	E
PROC	Level of separation	Localised controls (LC)	(according to MEASE)	Further information
PROC 19	Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration	not applicable	na	-
All other applicable PROCs	can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required	na	-
Organisational measu	res to prevent /limit releases, disp	ersion and expos	sure	
substance. These meas devices), no eating and	stion. General occupational hygiene sures involve good personal and hou smoking at the workplace, the wear nge clothes at end of work shift. Do	sekeeping practice	es (i.e. regular cleaning rking clothes and shoes	with suitable cleaning s unless otherwise state



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Conditions and measu	res related to personal protection	n, h <mark>ygiene and he</mark> a	alth evaluation	
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 4, 5, 11, 26	FFP1 mask	APF=4		Eye protection
PROC 16, 17, 18, 25	FFP2 mask	APF=10		equipment (e.g. goggles or visors) must
All other applicable PROCs	not required	na	Since calcium dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	be worn, unless potential contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.
For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.				
	Quantity per m3 (:			
	120	,	Wind speed	L: 🕺
	100		 	
			- 6 m/s	
	80		- 3.5 m/s	
	0			
	1 3	Z 11	15 20	
			Distance fro	
			mmandam (in	
		2	spreader(in	m)



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Amounts used			
Ca(OH)2	2,244 kg/ha		
Frequency and duration	on of use		
1 day/year (one applica 2,244 kg/ha is not excee	tion per year). Multiple applications during the year are allowed, provided the total yearly amount of eded (CaOH2)		
	ot influenced by risk management		
Volume of surface water Field surface area: 1 ha	r: 300 L/m²		
	al conditions affecting environmental exposure		
Outdoor use of products Soil mixing depth: 20 cm			
Technical conditions a	and measures at process level (source) to prevent release		
There are no direct relea	ases to adjacent surface waters.		
Technical conditions a	and measures to reduce or limit discharges, air emissions and releases to soil		
Drift should be minimise	d.		
Organizational measure	res to prevent/limit release from site		
	ents for good agricultural practice, agricultural soil should be analysed prior to application of lime and uld be adjusted according to the results of the analysis.		
2.2 Control of env	ironmental exposure – only relevant for soil treatment in civil engineering		
Product characteristic	S		
	Quantity of dust per m3 (in mg) Wind speed: - 3.5 m/s - 6 m/s - 3.5 m/s - 3.5 m/s - 3.5 m/s Distance from the spreader(in m)		
	(Figure taken from: Laudet, A. et al., 1999)		
Amounts used			
Ca(OH)2	238,208 kg/ha		
	ce in a lifetime. Multiple applications during the year are allowed, provided the total yearly amount of		
· · ·	238,208 kg/ha is not exceeded (CaOH2) Environment factors not influenced by risk management		
Field surface area: 1 ha			



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Outdoor use of products Soil mixing depth: 20 cm

Technical conditions and measures at process level (source) to prevent release

Lime is only applied onto the soil in the technosphere zone before road construction. There are no direct releases to adjacent surface waters.

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

Drift should be minimised.

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium dihydroxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 21, 25, 26	MEASE	< 1 mg/m³ (0.01 – 0.75)	irritating to skin, den minimised as far as DNEL for dermal effec Thus, dermal exposu	droxide is classified as mal exposure has to be technically feasible. A cts has not been derived. re is not assessed in this e scenario.

Environmental exposure for agricultural soil protection

The PEC calculation for soil and surface water was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data: once applied on the soil, calcium dihydroxide can indeed migrate then towards surface waters, via drift.

applied off the soli, outor	ium umyuluxiue can inueeu migrale	then towards suna		
Environmental emissions	See amounts used			
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil pro	otection		
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR
concentration in aquatic pelagic compartment	Ca(OH)2	7.48	490	0.015
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.			
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR
concentrations in soil and groundwater	Ca(OH)2	660	1080	0.61
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide is not volatile. The vapour pressures is below 10 ⁻⁵ Pa.			
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because environment. The uses covered do (Ca2+ and OH-) in the environmen	not significantly in		



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Environmental exposure for soil treatment in civil engineering

The soil treatment in civil engineering scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

	iere parameters such as units can b	c improved accord	ing to conceted data.	
Environmental emissions	See amounts used			
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road border scenario			
Exposure concentration in aquatic pelagic compartment	Not relevant for road border scenario			
Exposure concentration in sediments	Not relevant for road border scenario			
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR
concentrations in soil and groundwater	Ca(OH)2	701	1080	0.65
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide is not volatile. The vapour pressures is below 10 ⁻⁵ Pa.			
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca2+ and OH-) in the environment.			
Environmental exposu	ire for other uses			
	antitative environmental exposure a			

The operational conditions and risk management measures are less stringent than those outlined for agricultural soil
 protection or soil treatment in civil engineering

• Lime is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pH-shift in soil, wastewater or surface water

• Lime is specifically used to release CO2-free breathable air, upon reaction with CO2. Such applications only relates to the air compartment, where the lime properties are exploited

• Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

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. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustyr.

DNEL_{inhalation}: 1 mg/m³ (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.8: Professional uses of medium dusty solids/powders of lime substances

Exposure Scenari	o Format (1) addressing uses carried out	t by workers	
1. Title			
Free short title	Professional uses of medium dusty so	blids/powders of lime substances	
Systematic title based on use descriptor	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23, SU24 PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC39, PC40 AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13		
Processes, tasks and/or activities covered	(appropriate PROCs and ERCs a Processes, tasks and/or activities covere		
Assessment Method	The assessment of inhalation exposure is based o environmental assessment is b		
2. Operational con	ditions and risk management measures		
PROC/ERC	REACH definition	Involved tasks	
PROC 2	Use in closed, continuous process with occasional controlled exposure		
PROC 3	Use in closed batch process (synthesis or formulation)		
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises		
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)		
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities		
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)		
PROC 10	Roller application or brushing	Further information is provided in the ECHA Guidance on information requirements and	
PROC 11	Non industrial spraying	chemical safety assessment, Chapter R.12:	
PROC 13	Treatment of articles by dipping and pouring	Use descriptor system (ECHA-2010-G-05- EN).	
PROC 15	Use as laboratory reagent		
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected		
PROC 17	Lubrication at high energy conditions and in partly open process		
PROC 18	Greasing at high energy conditions		
PROC 19	Hand-mixing with intimate contact and only PPE available		
PROC 25	Other hot work operations with metals		
PROC 26	Handling of solid inorganic substances at ambient temperature		
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems		



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

	;			
is reflected by an assigr at ambient temperature temperature based, taki	E approach, the substance-intrinsic imment of a so-called fugacity class in the fugacity is based on the dustine ing into account the process tempera ed on the level of abrasion instead of	the MEASE tool. I ss of that substanc ature and the melti	For operations conduc e. Whereas in hot met ng point of the substan	ted with solid substance al operations, fugacity is ice. As a third group, hig
PROC	Use in preparation	Content in preparation	Physical form	Emission potential
PROC 25	not restricted		solid/powder, molten	high
All other applicable PROCs	not restricted		solid/powder	medium
Amounts used				
combination of the scale	dled per shift is not considered to in e of operation (industrial vs. professi erminant of the process intrinsic emis	onal) and level of c		
Frequency and duration	on of use/exposure			
PROC		Duration of e	xposure	
PROC 11, 16, 17, 18, 19		≤ 240 min	utes	
All other applicable PROCs		480 minutes (not	t restricted)	
Human factors not inf	luenced by risk management			
The shift breathing volu	me during all process steps reflected	d in the PROCs is a	assumed to be 10 m³/s	hift (8 hours).
Operational conditions I	al conditions affecting workers ex ike process temperature and proces ducted processes. In process steps v	s pressure are not		
Operational conditions I assessment of the conc exposure assessment in temperatures are expect exposure estimation. Th PROC 25.	ike process temperature and process ducted processes. In process steps v in MEASE is however based on the r sted to vary within the industry the hi- hus all process temperatures are aut	s pressure are not vith considerably hi atio of process tem ghest ratio was tak omatically covered	igh temperatures (i.e. I perature and melting p en as a worst case as in this exposure scena	PROC 22, 23, 25), the point. As the associated sumption for the
Operational conditions I assessment of the conc exposure assessment in temperatures are expec exposure estimation. Th PROC 25. Technical conditions a	ike process temperature and process ducted processes. In process steps v in MEASE is however based on the r sted to vary within the industry the hi hus all process temperatures are aut	s pressure are not vith considerably hi atio of process tem ghest ratio was tak omatically covered purce) to prevent r	igh temperatures (i.e. I perature and melting p en as a worst case as in this exposure scena release	PROC 22, 23, 25), the point. As the associated sumption for the ario for PROC 22, 23 an
Operational conditions I assessment of the conc exposure assessment in temperatures are expec exposure estimation. Th PROC 25. Technical conditions a Risk management mea	ike process temperature and process ducted processes. In process steps v in MEASE is however based on the r sted to vary within the industry the hi- hus all process temperatures are aut and measures at process level (so sures at the process level (e.g. con	s pressure are not vith considerably hi atio of process tem ghest ratio was tak omatically covered purce) to prevent r	igh temperatures (i.e. I perature and melting p en as a worst case as in this exposure scena release	PROC 22, 23, 25), the point. As the associated sumption for the ario for PROC 22, 23 an
Operational conditions I assessment of the conc exposure assessment in temperatures are expect exposure estimation. Th PROC 25. Technical conditions a Risk management mea required in the processe	ike process temperature and process ducted processes. In process steps v in MEASE is however based on the r sted to vary within the industry the hi- nus all process temperatures are aut and measures at process level (so sures at the process level (e.g. con	s pressure are not vith considerably hi atio of process tem ghest ratio was tak omatically covered purce) to prevent r tainment or segreg	igh temperatures (i.e. I aperature and melting p en as a worst case as in this exposure scena release pation of the emission wards the worker	PROC 22, 23, 25), the point. As the associated sumption for the ario for PROC 22, 23 an
Operational conditions I assessment of the conc exposure assessment in temperatures are expect exposure estimation. Th PROC 25. Technical conditions a Risk management mea required in the processe Technical conditions a	ike process temperature and process ducted processes. In process steps v in MEASE is however based on the r exted to vary within the industry the hi hus all process temperatures are aut and measures at process level (so sures at the process level (e.g. con es. and measures to control dispersion Level of separation	s pressure are not vith considerably hi atio of process tem ghest ratio was tak omatically covered purce) to prevent r tainment or segreg	igh temperatures (i.e. I aperature and melting p en as a worst case as in this exposure scena release pation of the emission	PROC 22, 23, 25), the point. As the associated sumption for the ario for PROC 22, 23 an
Operational conditions I assessment of the conc exposure assessment in temperatures are expect exposure estimation. Th PROC 25. Technical conditions a Risk management mea required in the processe Technical conditions a PROC	ike process temperature and process ducted processes. In process steps v in MEASE is however based on the r end to vary within the industry the hi hus all process temperatures are aut and measures at process level (so sures at the process level (e.g. con es. and measures to control dispersion Level of separation Any potentially required separation of workers from the	s pressure are not vith considerably hi atio of process tem ghest ratio was tak omatically covered burce) to prevent r tainment or segreg bn from source tov Localised controls (LC) generic local exhaust ventilation	igh temperatures (i.e. I aperature and melting p en as a worst case ass in this exposure scena release gation of the emission wards the worker Efficiency of LC (according to	PROC 22, 23, 25), the point. As the associated sumption for the ario for PROC 22, 23 an source) are generally no
Operational conditions I assessment of the conc exposure assessment in temperatures are expect exposure estimation. The PROC 25. Technical conditions a Risk management mea required in the processes Technical conditions a PROC PROC 11, 16	ike process temperature and process ducted processes. In process steps v in MEASE is however based on the r end to vary within the industry the hi- hus all process temperatures are aut and measures at process level (so sures at the process level (e.g. con es. and measures to control dispersion Level of separation Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A	s pressure are not vith considerably hi atio of process tem ghest ratio was tak omatically covered burce) to prevent r tainment or segreg bn from source tor Localised controls (LC) generic local exhaust	igh temperatures (i.e. I aperature and melting p en as a worst case ass in this exposure scena release gation of the emission wards the worker Efficiency of LC (according to MEASE)	PROC 22, 23, 25), the point. As the associated sumption for the ario for PROC 22, 23 an source) are generally no
Operational conditions I assessment of the conc exposure assessment in temperatures are expec- exposure estimation. The PROC 25. Technical conditions a Risk management mea required in the processe Technical conditions a PROC PROC 11, 16 PROC 17, 18	ike process temperature and process ducted processes. In process steps v in MEASE is however based on the r end to vary within the industry the hi- nus all process temperatures are aut and measures at process level (so sures at the process level (e.g. con es. and measures to control dispersion Level of separation Any potentially required separation of workers from the emission source is indicated above under "Frequency and	s pressure are not vith considerably hi atio of process tem ghest ratio was tak omatically covered purce) to prevent r tainment or segreg bn from source tor Localised controls (LC) generic local exhaust ventilation integrated local exhaust	igh temperatures (i.e. I perature and melting p en as a worst case as in this exposure scena release pation of the emission wards the worker Efficiency of LC (according to MEASE) 72 %	PROC 22, 23, 25), the point. As the associated sumption for the ario for PROC 22, 23 an source) are generally n
Operational conditions I assessment of the conc exposure assessment in temperatures are expec- exposure estimation. Th PROC 25. Technical conditions a Risk management mea required in the processe Technical conditions a PROC PROC 11, 16 PROC 17, 18 PROC 19 All other applicable	ike process temperature and process ducted processes. In process steps v in MEASE is however based on the r teted to vary within the industry the hi- nus all process temperatures are aut and measures at process level (so sures at the process level (e.g. con es. and measures to control dispersion Level of separation Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by	s pressure are not vith considerably hi atio of process tem ghest ratio was tak omatically covered purce) to prevent r tainment or segreg on from source too Localised controls (LC) generic local exhaust ventilation integrated local exhaust ventilation	igh temperatures (i.e. I aperature and melting p en as a worst case ass in this exposure scena release ation of the emission wards the worker Efficiency of LC (according to MEASE) 72 % 87 %	PROC 22, 23, 25), the point. As the associated sumption for the ario for PROC 22, 23 an source) are generally n
Operational conditions I assessment of the conc exposure assessment in temperatures are expect exposure estimation. Th PROC 25. Technical conditions a required in the processe Technical conditions a PROC PROC 11, 16 PROC 17, 18 PROC 19 All other applicable PROCs	ike process temperature and process ducted processes. In process steps v in MEASE is however based on the r teted to vary within the industry the hi- nus all process temperatures are aut and measures at process level (so sures at the process level (e.g. con es. and measures to control dispersion Level of separation Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with	s pressure are not vith considerably hi atio of process tem ghest ratio was tak omatically covered burce) to prevent r tainment or segreg bn from source tov Localised controls (LC) generic local exhaust ventilation integrated local exhaust ventilation not applicable not required	igh temperatures (i.e. I iperature and melting p en as a worst case ass in this exposure scenar release pation of the emission wards the worker Efficiency of LC (according to MEASE) 72 % 87 % na na	PROC 22, 23, 25), the point. As the associated sumption for the ario for PROC 22, 23 an source) are generally n



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 2, 3, 16, 19	FFP1 mask	APF=4		Eye protection equipment (e.g.
PROC 4, 5, 8a, 8b, 9, 10, 13, 17, 18, 25, 26	FFP2 mask	APF=10	Since calcium dihydroxide is classified as	goggles or visors) mus be worn, unless
PROC 11	FFP1 mask	APF=10		potential contact with
PROC 15	not required	na	irritating to skin, the use of protective gloves is mandatory for all process steps.	the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate
devices and the manage policy for a respiratory p An overview of the APFs 2.2 Control of env Product characteristic	employed persons have legal respon- ement of their correct use in the wor- protective device programme includi s of different RPE (according to BS ironmental exposure – online s se estimate based on data from dust	kplace. Therefore, ng training of the w EN 529:2005) can y relevant for a	they should define and orkers. be found in the glossar agricultural soil p	I document a suitable by of MEASE.
	Quantity	of dust		
	Quantity per m3 (:			
			Wind speed	1: 1
	per m3 (:		Wind speed - 3.5 m/s - 6 m/s - 3.5 m/s	1:
	per m3 (: 120 100 80 60 40 20	in mg)	- 3.5 m/s - 6 m/s	m the
	per m3 (: 120 100 80 60 40 20 0	in mg)	- 3.5 m/s - 6 m/s - 3.5 m/s 15 20 Distance from spreader(in	m the
Amounts used	per m3 (: 120 100 80 60 40 20 0 1 3	in mg)	- 3.5 m/s - 6 m/s - 3.5 m/s 15 20 Distance from spreader(in	m the
Amounts used Ca(OH)2	per m3 (: 120 100 80 60 40 20 0 1 3	in mg)	- 3.5 m/s - 6 m/s - 3.5 m/s -	m the



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Environment factors not influenced by risk management Volume of surface water: 300 L/m² Field surface area: 1 ha Other given operational conditions affecting environmental exposure Outdoor use of products Soil mixing depth: 20 cm Technical conditions and measures at process level (source) to prevent release There are no direct releases to adjacent surface waters. Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil Drift should be minimised. Organizational measures to prevent/limit release from site In line with the requirements for good agricultural practice, agricultural soil should be analysed prior to application of lime and the application rate should be adjusted according to the results of the analysis. 2.2 Control of environmental exposure – only relevant for soil treatment in civil engineering **Product characteristics** Drift: 1% (very worst-case estimate based on data from dust measurements in air as a function of the distance from application) Quantity of dust per m3 (in mg) 120 Wind speed: 3.5 m/s 100 6 m/s 80 3.5 m/s 60 40 20 0 11 15 7 20 3 Distance from the spreader(in m) (Figure taken from: Laudet, A. et al., 1999) Amounts used Ca(OH)2 238,208 kg/ha Frequency and duration of use 1 day/year and only once in a lifetime. Multiple applications during the year are allowed, provided the total yearly amount of 238,208 kg/ha is not exceeded (CaOH2) Environment factors not influenced by risk management Field surface area: 1 ha Other given operational conditions affecting environmental exposure Outdoor use of products Soil mixing depth: 20 cm Technical conditions and measures at process level (source) to prevent release

Lime is only applied onto the soil in the technosphere zone before road construction. There are no direct releases to adjacent surface waters.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

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

Drift should be minimised.

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium dihydroxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)	
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 25, 26	MEASE	< 1 mg/m³ (0.25 – 0.825)	irritating to skin, der minimised as far as DNEL for dermal effe Thus, dermal exposu	droxide is classified as mal exposure has to be a technically feasible. A cts has not been derived. re is not assessed in this re scenario.	
Environmental exposu	re for agricultural soil protection				
guidance on the calculat ground water, surface w EUSES as it is more app included in the modelling basis of the German EX	soil and surface water was based of tion of predicted environmental cond ater and sediment (Kloskowksi et al propriate for agricultural-like applica g. FOCUS is a model typically devel POSIT 1.0 model, where parameter um dihydroxide can indeed migrate	centration values (F I., 1999). The FOC tion as in this case loped for biocidal a is such as drifts car	EC) of plant protection US/EXPOSIT modelling where parameter as the pplications and was fur to be improved accordire	n products for soil, g tool is preferred to the ne drift needs to be rther elaborated on the	
emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil pro	otection			
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
concentration in aquatic pelagic compartment	Ca(OH)2	7.48	490	0.015	
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.				
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
concentrations in soil and groundwater	Ca(OH)2	660	1080	0.61	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium	dihydroxide is not	volatile. The vapour pre	essures is below 10⁻⁵ Pa.	
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because environment. The uses covered do (Ca2+ and OH-) in the environmer	o not significantly in			



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006. Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Environmental exposure for soil treatment in civil engineering

The soil treatment in civil engineering scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

EXTOOL 1.0 model, W	iere parameters such as units can b	c improved accord	ing to concoled dutu.	
Environmental emissions	See amounts used			
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road border scena	rio		
Exposure concentration in aquatic pelagic compartment	Not relevant for road border scenario			
Exposure concentration in sediments	Not relevant for road border scenario			
Exposure concentrations in	Substance	PEC (mg/L)	PNEC (mg/L)	RCR
soil and groundwater	Ca(OH)2	701	1080	0.65
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide is not volatile. The vapour pressures is below 10 ⁻⁵ Pa.			
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca2+ and OH-) in the environment.			
Environmental exposu	ire for other uses			
For all other uses, no qu	antitative environmental exposure a	ssessment is carrie	ed because	

The operational conditions and risk management measures are less stringent than those outlined for agricultural soil protection or soil treatment in civil engineering

Lime is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pH-shift in soil, wastewater or surface water

Lime is specifically used to release CO2-free breathable air, upon reaction with CO2. Such applications only relates to the air compartment, where the lime properties are exploited

Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

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. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustory".

DNEL_{inhalation}: 1 mg/m³ (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.9: Professional uses of high dusty solids/ powders of lime substances

Exposure Scenari	o Format (1) addressing uses carried out	t by workers	
1. Title			
Free short title	Professional uses of high dusty solid	ds/powders of lime substances	
	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, S		
Systematic title based on use descriptor	SU23, SU24 PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC39, PC40 AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13 (appropriate PROCs and ERCs are given in Section 2 below)		
Processes, tasks and/or activities covered	Processes, tasks and/or activities covere		
Assessment Method	The assessment of inhalation exposure is based o environmental assessment is b		
2. Operational con	nditions and risk management measures		
PROC/ERC	REACH definition	Involved tasks	
PROC 2	Use in closed, continuous process with occasional controlled exposure		
PROC 3	Use in closed batch process (synthesis or formulation)		
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises		
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)		
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities		
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)		
PROC 10	Roller application or brushing	Further information is provided in the ECHA Guidance on information requirements and	
PROC 11	Non industrial spraying	chemical safety assessment, Chapter R.12:	
PROC 13	Treatment of articles by dipping and pouring	Use descriptor system (ECHA-2010-G-05- EN).	
PROC 15	Use as laboratory reagent		
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected		
PROC 17	Lubrication at high energy conditions and in partly open process		
PROC 18	Greasing at high energy conditions		
PROC 19	Hand-mixing with intimate contact and only PPE available		
PROC 25	Other hot work operations with metals		
PROC 26	Handling of solid inorganic substances at ambient temperature		
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems		



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

2.1 Control of wor	2.1 Control of workers exposure						
Product characteristic							
is reflected by an assign at ambient temperature temperature based, taking	E approach, the substance-intrinsic iment of a so-called fugacity class in the fugacity is based on the dustine ng into account the process tempera d on the level of abrasion instead of	the MEASE tool. F ss of that substance ature and the melting the substance intri	For operations conduct e. Whereas in hot metang point of the substand	ed with solid substances al operations, fugacity is ce. As a third group, high			
PROC	Use in preparation	preparation ²					
All applicable PROCs not restricted solid/powder high							
Amounts used							
combination of the scale	dled per shift is not considered to in e of operation (industrial vs. professi rminant of the process intrinsic emis	onal) and level of c					
Frequency and duration	on of use/exposure						
PROC		Duration of ex	xposure				
PROC 4, 5, 8a, 8b, 9, 10, 16, 17, 18, 19, 26		≤ 240 min	utes				
PROC 11		≤ 60 minu	ites				
All other applicable PROCs		480 minutes (not	restricted)				
Human factors not infl	uenced by risk management						
The shift breathing volur	me during all process steps reflected	d in the PROCs is a	assumed to be 10 m³/s	hift (8 hours).			
Other given operationa	al conditions affecting workers ex	posure					
assessment of the cond exposure assessment in temperatures are expect	ke process temperature and proces ucted processes. In process steps v n MEASE is however based on the r ted to vary within the industry the high us all process temperatures are aut	vith considerably hi atio of process tem ghest ratio was take	gh temperatures (i.e. F perature and melting p en as a worst case ass	PROC 22, 23, 25), the point. As the associated sumption for the			
Technical conditions a	and measures at process level (so	urce) to prevent r	elease				
Risk management meas required in the processe	sures at the process level (e.g. conta	ainment or segrega	tion of the emission so	ource) are generally not			
Technical conditions a	and measures to control dispersion	on from source to	wards the worker				
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information			
PROC 4, 5, 8a, 8b, 9, 11, 16, 26	Any potentially required separation of workers from the emission source is indicated	generic local exhaust ventilation	72 %	-			
PROC 17, 18	above under "Frequency and duration of exposure". A reduction of exposure duration	integrated local exhaust ventilation	87 %	-			
PROC 19	can be achieved, for example, by the installation of ventilated (positive pressure) control rooms	not applicable	na	only in well ventilated rooms or outdoors (efficiency 50 %)			
All other applicable PROCs	or by removing the worker from workplaces involved with relevant exposure.	not required	na	-			
Organisational measur	res to prevent /limit releases, disp	ersion and expos	ure				
substance. These meas devices), no eating and	stion. General occupational hygiene ures involve good personal and hou smoking at the workplace, the wear nge clothes at end of work shift. Do	sekeeping practice	s (i.e. regular cleaning king clothes and shoes	with suitable cleaning sunless otherwise stated			



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

	res related to personal protection			l	
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)	
PROC 9, 26	FFP1 mask	APF=4		Eye protection equipment (e.g.	
PROC 11, 17, 18, 19	FFP3 mask	APF=20	Since calcium dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	goggles or visors) mus be worn, unless	
PROC 25	FFP2 mask	APF=10		potential contact with the eye can be	
All other applicable PROCs	FFP2 mask	APF=10		excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate	
Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE. - only relevant for agricultural soil protection Quantity of dust per m3 (in mg) Wind speed: - 3.5 m/s - 3.5 m/					
Product characteristics	s the estimate based on data from dust Quantity per m3 (1 120 100 80 60 40	on measurements in a of dust in mg)	Wind speed - 3.5 m/s - 6 m/s - 3.5 m/s -	distance from application 1:	
Product characteristics	s se estimate based on data from dust Quantity per m3 (1 120 100 80 60 40 20 0	on measurements in a of dust in mg)	Wind speed - 3.5 m/s - 6 m/s - 3.5 m/s 15 20	distance from application 1:	
Product characteristics Drift: 1% (very worst-cas	s se estimate based on data from dust Quantity per m3 (1 120 100 80 60 40 20 0	on measurements in a of dust in mg) 7 11 I	Wind speed - 3.5 m/s - 6 m/s - 3.5 m/s -	distance from application 1:	
Product characteristics	s e estimate based on data from dust Quantity per m3 (1 120 100 80 60 40 20 0 1 3	on measurements in a of dust in mg) 7 11 I	Wind speed - 3.5 m/s - 6 m/s - 3.5 m/s - 3.5 m/s - 3.5 m/s - 3.5 m/s - 3.5 m/s - 15 20 Distance fro spreader (in	distance from application 1:	



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Environment factors not influenced by risk management Volume of surface water: 300 L/m2 Field surface area: 1 ha Other given operational conditions affecting environmental exposure Outdoor use of products Soil mixing depth: 20 cm Technical conditions and measures at process level (source) to prevent release There are no direct releases to adjacent surface waters. Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil Drift should be minimised. Organizational measures to prevent/limit release from site In line with the requirements for good agricultural practice, agricultural soil should be analysed prior to application of lime and the application rate should be adjusted according to the results of the analysis. 2.2 Control of environmental exposure – only relevant for soil treatment in civil engineering **Product characteristics** Drift: 1% (very worst-case estimate based on data from dust measurements in air as a function of the distance from application) Quantity of dust per m3 (in mg) 120 Wind speed: 3.5 m/s 100 6 m/s 80 3.5 m/s 60 40 20 0 11 15 7 20 3 Distance from the spreader(in m) (Figure taken from: Laudet, A. et al., 1999) Amounts used Ca(OH)2 238,208 kg/ha Frequency and duration of use 1 day/year and only once in a lifetime. Multiple applications during the year are allowed, provided the total yearly amount of 238,208 kg/ha is not exceeded (CaOH2) Environment factors not influenced by risk management Field surface area: 1 ha Other given operational conditions affecting environmental exposure Outdoor use of products Soil mixing depth: 20 cm Technical conditions and measures at process level (source) to prevent release

Lime is only applied onto the soil in the technosphere zone before road construction. There are no direct releases to adjacent surface waters.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

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

Drift should be minimised.

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium dihydroxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)	
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 25, 26	MEASE	<1 mg/m³ (0.5 – 0.825)	irritating to skin, den minimised as far as DNEL for dermal effer Thus, dermal exposu	droxide is classified as mal exposure has to be technically feasible. A cts has not been derived. re is not assessed in this re scenario.	
Environmental exposu	re for agricultural soil protection				
guidance on the calculat ground water, surface w EUSES as it is more app included in the modelling basis of the German EX applied on the soil, calci	soil and surface water was based of tion of predicted environmental cond ater and sediment (Kloskowksi et al propriate for agricultural-like applica g. FOCUS is a model typically devel POSIT 1.0 model, where parameter um dihydroxide can indeed migrate	centration values (F l., 1999). The FOC tion as in this case oped for biocidal a s such as drifts car	EC) of plant protection US/EXPOSIT modelling where parameter as the pplications and was fur to be improved according	n products for soil, g tool is preferred to the ne drift needs to be ther elaborated on the	
Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil pro	otection			
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
concentration in aquatic pelagic compartment	Ca(OH)2	7.48	490	0.015	
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.				
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
concentrations in soil and groundwater	Ca(OH)2	660	1080	0.61	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium	dihydroxide is not	volatile. The vapour pre	essures is below 10⁻⁵ Pa.	
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because environment. The uses covered do (Ca2+ and OH-) in the environmer	o not significantly in			



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Environmental exposure for soil treatment in civil engineering

The soil treatment in civil engineering scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

where parameters such				
Environmental emissions	See amounts used			
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road border scenario			
Exposure concentration in aquatic pelagic compartment	Not relevant for road border scenario			
Exposure concentration in sediments	Not relevant for road border scenario			
Exposure	Substance PEC (mg/L) PNEC (mg/L) RCR			
concentrations in	Ca(OH)2 701 1080 0.65			
soil and groundwater	Ca(OH)2	701	1080	0.65
	Ca(OH)2 This point is not relevant. Calcium			
soil and groundwater Exposure concentration in atmospheric		dihydroxide is not v calcium can be cor not significantly in	volatile. The vapour pre	essures is below 10 ⁻⁵ Pa. sent and essential in the
soil and groundwater Exposure concentration in atmospheric compartment Exposure concentration relevant for the food chain (secondary	This point is not relevant. Calcium This point is not relevant because environment. The uses covered do (Ca2+ and OH-) in the environmen	dihydroxide is not v calcium can be cor not significantly in	volatile. The vapour pre	essures is below 10 ⁻⁵ Pa. sent and essential in the

The operational conditions and risk management measures are less stringent than those outlined for agricultural soil

protection or soil treatment in civil engineering

• Lime is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pH-shift in soil, wastewater or surface water

• Lime is specifically used to release CO2-free breathable air, upon reaction with CO2. Such applications only relates to the air compartment, where the lime properties are exploited

• Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

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. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness less than 10 % (RDM) are defined as "medium dusty".

DNEL_{inhalation}: 1 mg/m³ (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN	
Revision date: September/2010	Printing Date: June/2019

ES number 9.10: Professional use of lime substances in soil treatment

Exposure Scenario	Format (1) addressing uses carr	led out by workers		
1. Title				
Free short title	Professional use of lime substances in soil treatment			
Systematic title based on use descriptor	SU22 (appropriate PROCs and ERCs are given in Section 2 below)			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are described in Section 2 below.			
Assessment Method	The assessment of inhalation exposure is based on measured data and on the exposure estimation tool MEASE. The environmental assessment is based on FOCUS-Exposit.			
2. Operational cond	litions and risk management mea	asures		
Task/ERC	REACH definition	Invo	lved tasks	
Milling	PROC 5			
Loading of spreader	PROC 8b, PROC 26		f calcium dihydroxide for soil eatment.	
Application to soil (spreading)	PROC 11			
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems	Calcium dihydroxide is applied in numerous cases wide dispersive uses: agricultural, forestry, fish a shrimps farming, soil treatment and environment protection.		
2.1 Control of workers exposure				
2.1 Control of work	ers exposure			
2.1 Control of work Product characteristic	ers exposure			
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature th temperature based, taking	approach, the substance-intrinsic emission lent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that g into account the process temperature and	SE tool. For operations co substance. Whereas in ho the melting point of the sul	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high	
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature th temperature based, taking	approach, the substance-intrinsic emission ent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that	SE tool. For operations co substance. Whereas in ho the melting point of the sul	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high	
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature the temperature based, taking abrasive tasks are based	approach, the substance-intrinsic emission lent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that g into account the process temperature and on the level of abrasion instead of the subst Lise in preparation Content in	SE tool. For operations co substance. Whereas in ho the melting point of the sul ance intrinsic emission por	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high tential.	
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature th temperature based, taking abrasive tasks are based Task Milling Loading of spreader	approach, the substance-intrinsic emission tent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that into account the process temperature and on the level of abrasion instead of the subst Use in preparation Content in preparation	SE tool. For operations co substance. Whereas in ho the melting point of the sul ance intrinsic emission por Physical form	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high tential. Emission potential	
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature th temperature based, taking abrasive tasks are based Task Milling	approach, the substance-intrinsic emission lent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that g into account the process temperature and on the level of abrasion instead of the subst Use in preparation Not restricted	SE tool. For operations co substance. Whereas in ho the melting point of the sul ance intrinsic emission por Physical form solid/powder	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high tential. Emission potential high	
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature th temperature based, taking abrasive tasks are based Task Milling Loading of spreader Application to soil	approach, the substance-intrinsic emission tent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that jinto account the process temperature and on the level of abrasion instead of the subst Use in preparation Not restricted not restricted	SE tool. For operations co substance. Whereas in ho the melting point of the sul ance intrinsic emission point Physical form solid/powder solid/powder	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high tential. Emission potential high high	
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature th temperature based, taking abrasive tasks are based Task Milling Loading of spreader Application to soil (spreading) Amounts used The actual tonnage handl combination of the scale of	approach, the substance-intrinsic emission tent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that jinto account the process temperature and on the level of abrasion instead of the subst Use in preparation Not restricted not restricted	SE tool. For operations co substance. Whereas in ho the melting point of the sul ance intrinsic emission point Physical form solid/powder solid/powder solid/powder e exposure as such for this level of containment/autor	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high tential. Emission potential high high high s scenario. Instead, the	
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature th temperature based, taking abrasive tasks are based Task Milling Loading of spreader Application to soil (spreading) Amounts used The actual tonnage handl combination of the scale of	approach, the substance-intrinsic emission tent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that into account the process temperature and on the level of abrasion instead of the subst Use in preparation Not restricted not restricted not restricted ed per shift is not considered to influence th of operation (industrial vs. professional) and ninant of the process intrinsic emission pote	SE tool. For operations co substance. Whereas in ho the melting point of the sul ance intrinsic emission point Physical form solid/powder solid/powder solid/powder e exposure as such for this level of containment/autor	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high tential. Emission potential high high high s scenario. Instead, the	
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature the temperature based, taking abrasive tasks are based Task Milling Loading of spreader Application to soil (spreading) Amounts used The actual tonnage handl combination of the scale of PROC) is the main determ	approach, the substance-intrinsic emission eent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that g into account the process temperature and on the level of abrasion instead of the subst Use in preparation not restricted not restricted not restricted ed per shift is not considered to influence th of operation (industrial vs. professional) and ninant of the process intrinsic emission pote of use/exposure	SE tool. For operations co substance. Whereas in ho the melting point of the sul ance intrinsic emission point Physical form solid/powder solid/powder solid/powder e exposure as such for this level of containment/autor	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high tential. Emission potential high high high s scenario. Instead, the	
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature the temperature based, taking abrasive tasks are based Task Milling Loading of spreader Application to soil (spreading) Amounts used The actual tonnage handl combination of the scale of PROC) is the main determ Frequency and duration	approach, the substance-intrinsic emission eent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that g into account the process temperature and on the level of abrasion instead of the subst Use in preparation not restricted not restricted not restricted ed per shift is not considered to influence th of operation (industrial vs. professional) and ninant of the process intrinsic emission pote of use/exposure	SE tool. For operations co substance. Whereas in ho the melting point of the sul ance intrinsic emission por Physical form solid/powder solid/powder solid/powder e exposure as such for this level of containment/autom ntial.	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high tential. Emission potential high high high s scenario. Instead, the	
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature th temperature based, taking abrasive tasks are based Task Milling Loading of spreader Application to soil (spreading) Amounts used The actual tonnage handl combination of the scale of PROC) is the main determ Frequency and duration Task Milling Loading of spreader	approach, the substance-intrinsic emission eent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that g into account the process temperature and on the level of abrasion instead of the subst Use in preparation not restricted not restricted not restricted ed per shift is not considered to influence th of operation (industrial vs. professional) and ninant of the process intrinsic emission pote of use/exposure	SE tool. For operations co substance. Whereas in ho the melting point of the sul ance intrinsic emission point Physical form solid/powder solid/powder solid/powder solid/powder e exposure as such for this level of containment/autom ntial.	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high tential. Emission potential high high high s scenario. Instead, the	
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature the temperature based, taking abrasive tasks are based Task Milling Loading of spreader Application to soil (spreading) Amounts used The actual tonnage handl combination of the scale of PROC) is the main determ Frequency and duration Task Milling	approach, the substance-intrinsic emission tent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that into account the process temperature and on the level of abrasion instead of the subst Use in preparation Content in preparation not restricted not restricted not restricted ed per shift is not considered to influence th of operation (industrial vs. professional) and hinant of the process intrinsic emission pote of use/exposure Dur	SE tool. For operations co substance. Whereas in ho the melting point of the sub ance intrinsic emission por Physical form solid/powder solid/powder solid/powder e exposure as such for this level of containment/autom ntial.	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high tential. Emission potential high high high s scenario. Instead, the	
Product characteristic According to the MEASE is reflected by an assignm at ambient temperature the temperature based, taking abrasive tasks are based Task Milling Loading of spreader Application to soil (spreading) Amounts used The actual tonnage handl combination of the scale of PROC) is the main determ Frequency and duration Task Milling Loading of spreader Application to soil (spreading)	approach, the substance-intrinsic emission tent of a so-called fugacity class in the MEA e fugacity is based on the dustiness of that into account the process temperature and on the level of abrasion instead of the subst Use in preparation Content in preparation not restricted not restricted not restricted ed per shift is not considered to influence th of operation (industrial vs. professional) and hinant of the process intrinsic emission pote of use/exposure Dur	SE tool. For operations co substance. Whereas in ho the melting point of the sul ance intrinsic emission point Physical form solid/powder solid/powder solid/powder solid/powder solid/powder e exposure as such for this level of containment/auton ntial. ation of exposure 240 minutes	nducted with solid substances t metal operations, fugacity is ostance. As a third group, high tential. Emission potential high high high s scenario. Instead, the	



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Other given operational conditions affecting workers exposure

Operational conditions (e.g. process temperature and process pressure) are not considered relevant for occupational exposure assessment of the conducted processes.

Technical conditions and measures at process level (source) to prevent release

Risk management measures at the process level (e.g. containment or segregation of the emission source) are generally not required in the processes.

Technical conditions and measures to control dispersion from source towards the worker

Task	Level of separation	Localised controls (LC)	Efficiency of LC	Further information
Milling	Separation of workers is generally	not required	na	-
Loading of spreader	not required in the conducted processes.	not required	na	-
Application to soil (spreading)	During application the worker is sitting in the cabin of the spreader	Cabin with filtered air supply	99%	-

Organisational measures to prevent /limit releases, dispersion and exposure

Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.

Conditions and measures related to personal protection, hygiene and health evaluation				
Task	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
Milling	FFP3 mask	APF=20	Since calcium dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.
Loading of spreader	FFP3 mask	APF=20		
Application to soil (spreading)	not required	na		

Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely.

The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers.

An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.

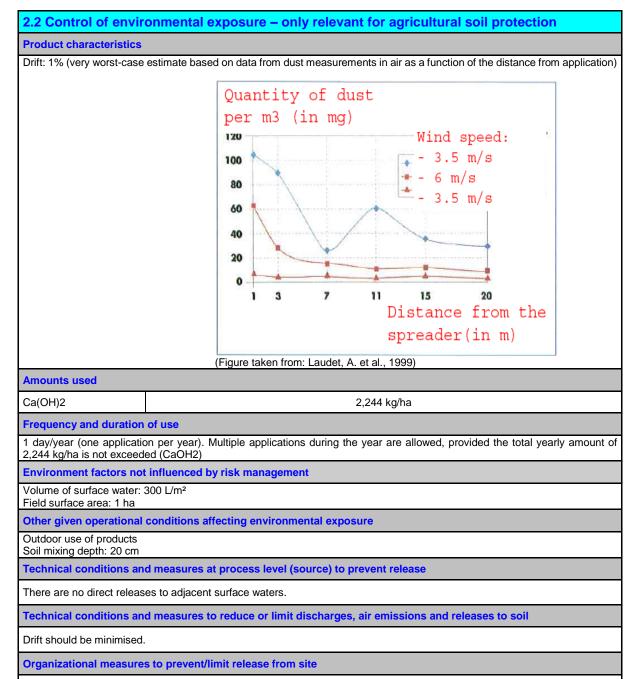


prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019



In line with the requirements for good agricultural practice, agricultural soil should be analysed prior to application of lime and the application rate should be adjusted according to the results of the analysis.

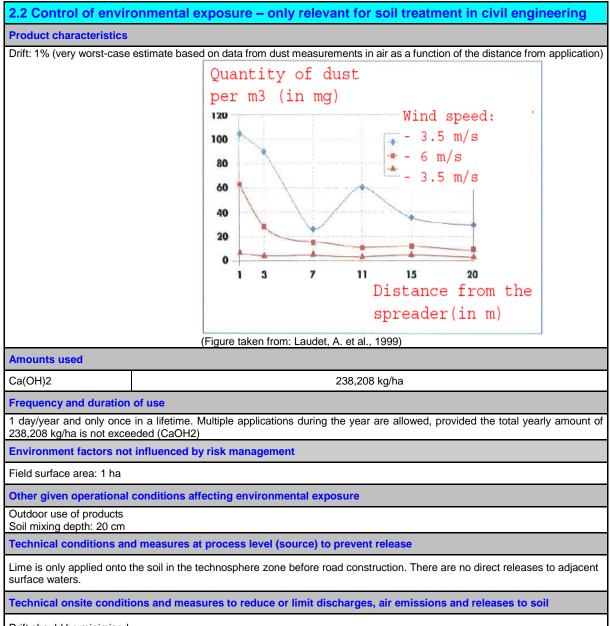


prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019



Drift should be minimised.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

3. Exposure estimation and reference to its source

Occupational exposure

Measured data and modelled exposure estimates (MEASE) were used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium dihydroxide of 1 mg/m³ (as respirable dust).

Task	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
Milling	MEASE	0.488 mg/m ³ (0.48)	Since calcium dihydroxide is classified as irritating skin, dermal exposure has to be minimised as far	
Loading of spreader	MEASE (PROC 8b)	0.488 mg/m ³ (0.48)	technically feasible. A DNEL for dermal effects ha	NEL for dermal effects has not
Application to soil (spreading)	measured data	0.880 mg/m³ (0.88)	in this exposure scenario.	
Environmental exposure				
EUSES as it is more appro- included in the modelling. basis of the German EXP applied on the soil, calciur	on of predicted environm er and sediment (Klosko opriate for agricultural-lik FOCUS is a model typio OSIT 1.0 model, where p	ental concentration v owksi et al., 1999). T ke application as in t cally developed for b parameters such as	values (PEC) of plant prot he FOCUS/EXPOSIT mon his case where parameter iocidal applications and w drifts can be improved acc	ection products for soil, delling tool is preferred to the r as the drift needs to be as further elaborated on the cording to collected data: once
Environmental emissions	See amounts used			
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil protection			
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR
concentration in aquatic pelagic compartment	Ca(OH)2	7.48	490	0.015
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.			
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR
concentrations in soil and groundwater	Ca(OH)2	660	1080	0.61
Exposure concentration in atmospheric compartment	This point is not releva Pa.	nt. Calcium dihydrox	ide is not volatile. The vap	pour pressures is below 10⁻⁵
Exposure concentration relevant for the food chain (secondary poisoning)		uses covered do not		mnipresent and essential in distribution of the constituents



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Environmental exposure for soil treatment in civil engineering

The soil treatment in civil engineering scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

			3			
Environmental emissions	See amounts used	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road border scenario					
Exposure concentration in aquatic pelagic compartment	Not relevant for road border scenario					
Exposure concentration in sediments	Not relevant for road border scenario					
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR		
concentrations in soil and groundwater	Ca(OH)2	701	1080	0.65		
Exposure concentration in atmospheric compartment	This point is not releval Pa.	nt. Calcium dihydrox	ide is not volatile. The vap	pour pressures is below 10 ⁻⁵		
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca2+ and OH-) in the environment.					
Environmental exposure	e for other uses					
 Environmental exposure for other uses For all other uses, no quantitative environmental exposure assessment is carried because The operational conditions and risk management measures are less stringent than those outlined for agricultural soil protection or soil treatment in civil engineering Lime is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pH-shift in soil, wastewater or surface water 						

Lime is specifically used to release CO2-free breathable air, upon reaction with CO2. Such applications only relates
to the air compartment, where the lime properties are exploited

• Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

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. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness less than 10 % (RDM) are defined as "medium dusty".

DNEL_{inhalation}: 1 mg/m³ (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN
Revision date: September/2010

Printing Date: June/2019

ES number 9.11: Professional uses of articles/containers containing lime substances

Exposure Se	cenario Format (1) addressir	ng uses carri	ed out by workers						
1. Title									
Free short title	Professional us	Professional uses of articles/containers containing lime substances							
Systematic	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23,								
title based on use	AC1, AC2, AC		SU24 C6, AC7, AC8, AC10, AC1	1, AC13					
descriptor	(appropriate	PROCs and ER	Cs are given in Section 2	below)					
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are described in Section 2 below.								
Assessment Method	The assessment of inhalat	ion exposure is t	pased on the exposure est	imation tool MEASE.					
2. Operation	al conditions and risk mana	igement mea	sures						
PROC/ERC	REACH definition		Invo	lved tasks					
PROC 0	Other process (PROC 21 (low emission potential exposure estimation))	dihydroxide/preparatic breathir	ers containing calcium ons as CO_2 absorbents (e.g. ng apparatus)					
PROC 21	Low energy manipulation of substa materials and/or article			es bound in materials and/or articles					
PROC 24	High (mechanical) energy work-up bound in materials and/or a	of substances	Grinding, m	nechanical cutting					
PROC 25	Other hot work operations wit		Welding, soldering						
ERC10, ERC11, ERC 12	Wide dispersive indoor and outdoor articles and materials with lov		Calcium dihydroxide bound into or onto articles and materials such as: wooden and plastic construction and building materials (e.g. gutters, drains), flooring, furniture, toys, leather products, paper and cardboard products (magazines, books, news paper and packaging paper), electronic equipment (casing)						
2.1 Control	of workers exposure								
Product charac	teristic								
is reflected by a at ambient temp temperature bas	MEASE approach, the substance-int n assignment of a so-called fugacity c erature the fugacity is based on the d ed, taking into account the process te re based on the level of abrasion inst	lass in the MEAS lustiness of that s emperature and t ead of the substa	SE tool. For operations co substance. Whereas in ho he melting point of the sul	nducted with solid substances t metal operations, fugacity is bstance. As a third group, high					
PROC	Use in preparation	Content in preparation	Physical form	Emission potential					
PROC 0	not restricted		massive objects (pellets), low potential for dust formation due to abrasion during previous filling and handling activities of pellets, not during use of breathing apparatus	low (worst case assumption as no inhalation exposure is assumed during the use of the breathing apparatus due to the very low abrasive potential)					
PROC 21	not restricted		massive objects	very low					
PROC 24, 25	not restricted		massive objects	high					



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Amounts used								
combination of t	age handled per shift is not considere the scale of operation (industrial vs. p ain determinant of the process intrins	rofessional) and I	evel of containment/autor					
Frequency and	duration of use/exposure							
PROC		Duration	of exposure					
PROC 0		480 minutes (not restricted as far as occupational exposure to calcium dihydroxide is concerned, the actual wearing duration may be restricted due the user instructions of the actual breathing apparatus)						
PROC 21		480 minutes	(not restricted)					
PROC 24, 25		≤ 240	minutes					
Human factors	not influenced by risk managemen	nt						
The shift breath	ing volume during all process steps re	eflected in the PR	OCs is assumed to be 10) m³/shift (8 hours).				
Other given op	erational conditions affecting work	kers exposure						
PROC 25. Technical cond Risk manageme required in the p	ditions and measures at process level (e.gorocesses.	vel (source) to p	revent release segregation of the emissi	on source) are generally not				
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to	Further information				
PROC 0, 21, 24, 25 Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure. not required na								
Organisational	measures to prevent /limit release	s, dispersion an	d exposure					
substance. The devices), no eat	or ingestion. General occupational h se measures involve good personal a ting and smoking at the workplace, th and change clothes at end of work sh	nd housekeeping e wearing of stan	practices (i.e. regular cle dard working clothes and	aning with suitable cleaning shoes unless otherwise stated				



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)					
PROC 0, 21	not required	na	Since calcium	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential contact with the eye can be					
PROC 24, 25	FFP1 mask	dihydroxide is classified as irritating t skin, the use of protective gloves is							
the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.									
Product chara	octeristics								
	ally bound into/onto a matrix with very		ential						
Lime is chemic	ally bound into/onto a matrix with very		ential						
Lime is chemic 3. Exposure Occupational The exposure of (RCR) is the qu 1 to demonstra respirable dust	ally bound into/onto a matrix with very	o its source he assessment of te and the respec e, the RCR is bas ure estimate deriv	f inhalation exposure. The tive DNEL (derived no-eff ed on the DNEL for calciu ed using MEASE (as inha	ect level) and has to be below m dihydroxide of 1 mg/m ³ (as lable dust). Thus, the RCR					
Lime is chemic 3. Exposure Occupational The exposure of (RCR) is the qu 1 to demonstra respirable dust includes an add	ally bound into/onto a matrix with very e estimation and reference to exposure estimation tool MEASE was used for t uotient of the refined exposure estima- ite a safe use. For inhalation exposure) and the respective inhalation exposure	o its source he assessment of te and the respec e, the RCR is bas ure estimate deriv	f inhalation exposure. The tive DNEL (derived no-eff ed on the DNEL for calciu ed using MEASE (as inha	ect level) and has to be below m dihydroxide of 1 mg/m ³ (as lable dust). Thus, the RCR					
Lime is chemic 3. Exposure Occupational The exposure of (RCR) is the qu 1 to demonstra respirable dust includes an add 481. PROC	e estimation and reference to exposure estimation tool MEASE was used for t uotient of the refined exposure estima- te a safe use. For inhalation exposure) and the respective inhalation exposu- ditional safety margin since the respiration Method used for inhalation	he assessment of te and the respec e, the RCR is bas ure estimate deriv able fraction being Inhalation exposure estimate	f inhalation exposure. The tive DNEL (derived no-eff ed on the DNEL for calciu ed using MEASE (as inha g a sub-fraction of the inha Method used for dermal exposure assessment	ect level) and has to be below m dihydroxide of 1 mg/m ³ (as lable dust). Thus, the RCR alable fraction according to EN Dermal exposure estimate (RCR)					
Lime is chemic 3. Exposure Occupational The exposure of (RCR) is the qu 1 to demonstra respirable dust includes an add 481. PROC PROC 0	ally bound into/onto a matrix with very e estimation and reference to exposure estimation tool MEASE was used for t uotient of the refined exposure estimation te a safe use. For inhalation exposure) and the respective inhalation exposure ditional safety margin since the respiration Method used for inhalation exposure assessment	he assessment of te and the respec e, the RCR is bas ure estimate deriv able fraction being Inhalation exposure estimate (RCR) 0.5 mg/m ³	f inhalation exposure. The tive DNEL (derived no-eff ed on the DNEL for calciu ed using MEASE (as inha g a sub-fraction of the inha Method used for dermal exposure assessment Since calcium dihydrox skin, dermal exposure	ect level) and has to be below m dihydroxide of 1 mg/m ³ (as lable dust). Thus, the RCR alable fraction according to EN Dermal exposure estimate (RCR) ide is classified as irritating to has to be minimised as far as					
Lime is chemic 3. Exposure Occupational The exposure of (RCR) is the qu 1 to demonstra respirable dust includes an add 481.	ally bound into/onto a matrix with very e estimation and reference to exposure estimation tool MEASE was used for t uotient of the refined exposure estimation te a safe use. For inhalation exposure) and the respective inhalation exposure ditional safety margin since the respiration Method used for inhalation exposure assessment MEASE (PROC 21)	he assessment of te and the respec- e, the RCR is bas ire estimate derivable fraction being Inhalation exposure estimate (RCR) 0.5 mg/m ³ (0.5) 0.05 mg/m ³ (0.05) 0.825 mg/m ³ (0.825)	f inhalation exposure. The tive DNEL (derived no-eff ed on the DNEL for calciu ed using MEASE (as inha g a sub-fraction of the inha Method used for dermal exposure assessment Since calcium dihydrox skin, dermal exposure technically feasible. A D been derived. Thus, der	ect level) and has to be below m dihydroxide of 1 mg/m ³ (as lable dust). Thus, the RCR alable fraction according to EN Dermal exposure estimate (RCR) ide is classified as irritating to has to be minimised as far as NEL for dermal effects has no mal exposure is not assessed					
Lime is chemic 3. Exposure Occupational The exposure of (RCR) is the qu 1 to demonstra respirable dust includes an add 481. PROC PROC 0 PROC 21	ally bound into/onto a matrix with very e estimation and reference to exposure estimation tool MEASE was used for t uotient of the refined exposure estima- ite a safe use. For inhalation exposure) and the respective inhalation exposure ditional safety margin since the respiration Method used for inhalation exposure assessment MEASE (PROC 21) MEASE	he assessment of te and the respec a, the RCR is bas are estimate derival able fraction being Inhalation exposure estimate (RCR) 0.5 mg/m ³ (0.5) 0.05 mg/m ³ (0.05) 0.825 mg/m ³	f inhalation exposure. The tive DNEL (derived no-eff ed on the DNEL for calciu ed using MEASE (as inha g a sub-fraction of the inha Method used for dermal exposure assessment Since calcium dihydrox skin, dermal exposure technically feasible. A D been derived. Thus, der	ect level) and has to be below m dihydroxide of 1 mg/m ³ (as lable dust). Thus, the RCR alable fraction according to EN Dermal exposure estimate (RCR) ide is classified as irritating to					



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

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. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum dusty" and substances with a dustiness less than 10 % (RDM) are defined as "medium dusty"

DNEL_{inhalation}: 1 mg/m³ (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.12: Consumer use of building and construction material (DIY – do it yourself)

Exposure Scenario	Forma	t (2) add	Iressin	g uses carried out l	oy consul	mers		
1. Title								
Free short title				Consumer use of build	ding and co	Instruction materi	al	
Systematic title based	d on use	descript	or	SU21, PC9a, PC9b, ERC8c, ERC8d, ERC8e, ERC8f				
Processes, tasks activities covered			Handling (mixing and	filling) of po	owder formulatior	IS		
Assessment Method*				Application of liquid, pasty lime preparations. Human health: A qualitative assessment has been performed for oral and dermal exposure as well as exposure to the eye. Inhalation exposure to dust has been assessed by the Dutch model (van Hemmen, 1992). Environment: A qualitative justification assessment is provided.				
2. Operational co	nditior	is and	risk m					
RMM				ated risk management		are in place		
				ctivity referring to arti			vironmental release	
PC/ERC					cie calego		ivii oliillellali lelease	
PC 9a, 9b Application of lime Post-application of lime				g of powder containing e plaster, putty or slurry exposure. ndoor use resulting in ir	to the wall	s or ceiling.		
ERC 8c, 8d, 8e, 8f		Wide dis	persive c	outdoor use of processir outdoor use of reactive s outdoor use resulting in	substances	in open systems		
2.1 Control of cor				<u>_</u>				
Product characteristic								
Description of the		entration	of the	Physical state of	Dustine	ss (if relevant)	Packaging design	
preparation	subst	ance in t ration		the preparation				
Lime substance	100 %			Solid, powder		edium and low,	Bulk in bags of up to	
Plaster, Mortar	20-40	%		Solid, powder	of lime s (indicativ	ng on the kind ubstance /e value from t sheet see 2.0.3)	35 kg.	
Plaster, Mortar	20-40	%		Pasty	-	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-	
Putty, filler	30-55			Pasty, highly viscous, thick liquid	-		In tubes or buckets	
Pre-mixed lime wash paint	~30%			Solid, powder		ve value from t sheet see	Bulk in bags of up to 35 kg.	
Lime wash paint/milk of lime preparation	~ 30 %	6		Milk of lime preparation	-		-	
Amounts used		1.						
Description of the preparation				per event				
Filler, putty	_	Difficul		wder (2:1 powder wate mine, because the amo filled.		vily dependent on	the depth and size of	
Plaster/lime wash paint	t	~ 25 ko	depend	ding on the size of the room, wall to be treated.				
Floor/wall equalizer				ling on the size of the ro				
Frequency and durati	on of us							
Description of task				on of exposure per ev	ent	frequency of e	vents	
Mixing and loading of li powder.	me conta	aining	1.33 m	hin (DIY ¹ -fact sheet, RIVM, er 2.4.2 Mixing and loading of 2/year (DIY		2/year (DIY ¹ fac		
Application of lime plas slurry to the walls or ce		/ or		al minutes - hours 2/year (DIY ¹ fact sheet)				



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Human factors not inf	luenced b	y risk manage	ment				
Description of the task	Populat	ion exposed	Breathing rate		Exposed body part		Corresponding skin area [cm²]
Handling of powder	Adult		1.25 m³/hr		Half of both hands		430 (DIY ¹ fact sheet)
Application of liquid, pasty lime	Adult		NR		Hands and forearms		1900 (DIY ¹ fact sheet)
preparations.							
Other given operation						A !	
Description of the task	(Indoor/outdo	or				exchange rate
Handling of powder		indoor		small a	³ (personal space, Ill area around the user)		hr ⁻¹ (unspecified room)
Application of liquid, pas	sty lime	indoor		NR		NR	
preparations.							
Conditions and measu							
In order to avoid health workplaces:	-			ame stric	t protective measures	whic	h apply to professional
	-	oes and gloves	•				
					rious effective skin pro		
				an (skin p	protection, cleansing a	nd ca	are). Cleanse the skin
		k and apply a c					
Conditions and measu	ires relate	d to personal	protection and	hygiene			
In order to avoid health workplaces:	0				•		
						e all, o	during overhead work,
		as well as face					
Choose work	gloves ca	refully. Leather	gloves become	wet and	can facilitate burns. W	hen v	working in a wet
					ter. Wear gauntlet glov		
				iumaity v	which permeates the w	/OFKIN	ig ciolnes.
2.2 Control of env		ital exposu	e				
Product characteristic							
Not relevant for exposu	re assessr	nent					
Amounts used*		nont					
Not relevant for exposure Frequency and duration		nent					
Not relevant for exposu		nont					
Environment factors n			nagomont				
Default river flow and di		iceu by fisk fild	anayement				
Other given operation		one offecting o	nvironmontal	NDOCUL			
Indoor		shis allecting e	invironmentar	shposure		_	
Direct discharge to the	vastewate	r is avoided					
Conditions and measu			sewage treat	nent pla	nt		
Default size of municipa							
Conditions and measu							
Not relevant for exposu							
Conditions and measu			recovery of wa	ste			
Not relevant for exposu							
3. Exposure estim			e to its sour	Ce			
The risk characterisation					ro actimate and the reg	cnoct	ive DNEL (derived pe
effect level) and is giver substances of 4 mg/m ³ RCR includes an addition	n in parent (as respira	heses below. For ble dust) and the	or inhalation explore in the second	bosure, th halation e	ne RCR is based on the exposure estimate (as	ie acu inhal	ute DNEL for lime able dust). Thus, the
EN 481.							
Since limes are classifier and exposure to the eye		ing to skin and	eyes a qualitati	ve asses	sment has been perfor	rmed	for dermal exposure



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Human exposure Handling of powd	۵r	
Route of	Exposure estimate	Method used, comments
exposure	Exposure estimate	Wethou used, comments
Oral		Qualitative assessment
Ulai	-	Oral exposure does not occur as part of the intended product
		use.
Dermal	small task: 0.1 µg/cm ² (-)	Qualitative assessment
Dennai	large task: $1 \ \mu g/cm^2$ (-)	If risk reduction measures are taken into account no human
		exposure is expected. However, dermal contact to dust from
		loading of lime substances or direct contact to the lime cannot
		be excluded if no protective gloves are worn during application.
		This may occasionally result in mild irritation easily avoided by
		prompt rinsing with water.
		Quantitative assessment
		The constant rate model of ConsExpo has been used. The
		contact rate to dust formed while pouring powder has been
		taken from the DIY ¹ -fact sheet (RIVM report 320104007).
Eye	Dust	Qualitative assessment
		If risk reduction measures are taken into account no human
		exposure is expected. Dust from loading of the lime substances
		cannot be excluded if no protective goggles are used. Prompt
		rinsing with water and seeking medical advice after accidental
		exposure is advisable.
Inhalation	Small task: 12 µg/m ³ (0.003)	Quantitative assessment
	Large task: 120 µg/m ³ (0.03)	Dust formation while pouring the powder is addressed by using
		the dutch model (van Hemmen, 1992, as described in section
		9.0.3.1 above).
Application of liqu	uid, pasty lime preparations.	
Route of	Exposure estimate	Method used, comments
exposure		
Oral	-	Qualitative assessment
		Oral exposure does not occur as part of the intended product
		use.
Dermal	Splashes	Qualitative assessment
		If risk reduction measures are taken into account no human
		exposure is expected. However, splashes on the skin cannot be
		excluded if no protective gloves are worn during the application.
		Splashes may occasionally result in mild irritation easily avoided
_		by immediate rinsing of the hands with water.
Eye		
-	Splashes	Qualitative assessment
-	Opidanies	If appropriate goggles are worn no exposure to the eyes needs
-	Opiasiles	If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be
		If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application
-		If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead
	Spidsnes	If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice
		If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable.
Inhalation		If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Qualitative assessment
		If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Qualitative assessment Not expected, as the vapour pressure of limes in water is low
Inhalation	- -	If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Qualitative assessment
Inhalation Post-application e	- exposure	If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place.
Inhalation Post-application e No relevant exposu	- - exposure are will be assumed as the aqueous lir	If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Qualitative assessment Not expected, as the vapour pressure of limes in water is low
Inhalation Post-application e No relevant exposudioxide from the atr	- exposure ure will be assumed as the aqueous lin mosphere.	If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place.
Inhalation Post-application e No relevant exposu dioxide from the atr Environmental ex	xposure re will be assumed as the aqueous lir mosphere. posure	If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place. me preparation will quickly convert to calcium carbonate with carbon
Inhalation Post-application e No relevant exposu dioxide from the atr Environmental ex Referring to the OC	exposure ure will be assumed as the aqueous line mosphere. posure D/RMMs related to the environment to	If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place. me preparation will quickly convert to calcium carbonate with carbon avoid discharging lime solutions directly into municipal wastewater,
Inhalation Post-application e No relevant exposu dioxide from the atr Environmental ex Referring to the OC the pH of the influe	Provide a state and the second state and the s	If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place. me preparation will quickly convert to calcium carbonate with carbon avoid discharging lime solutions directly into municipal wastewater, nt plant is circum-neutral and therefore, there is no exposure to the
Inhalation Post-application e No relevant exposu dioxide from the atr Environmental ex Referring to the OC the pH of the influe biological activity. T	Pxposure Just will be assumed as the aqueous lin mosphere. posure //RMMs related to the environment to nt of a municipal wastewater treatmer Fhe influent of a municipal wastewater	If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place. me preparation will quickly convert to calcium carbonate with carbon avoid discharging lime solutions directly into municipal wastewater, nt plant is circum-neutral and therefore, there is no exposure to the treatment plant is often neutralized anyway and lime may even be
Inhalation Post-application e No relevant exposu dioxide from the atr Environmental ex Referring to the OC the pH of the influe biological activity. T used beneficially fo	exposure are will be assumed as the aqueous lir mosphere. posure 2/RMMs related to the environment to nt of a municipal wastewater treatmer The influent of a municipal wastewater or pH control of acid wastewater strear	If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place. me preparation will quickly convert to calcium carbonate with carbon avoid discharging lime solutions directly into municipal wastewater, nt plant is circum-neutral and therefore, there is no exposure to the



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.13: Consumer use of CO2 absorbent in breathing apparatuses

• •							
Exposure Scenario	Format (2) add	lressin	g uses carried out b	y consul	mers		
1. Title							
Free short title			Consumer use of CO.	abcorbont	t in broathing ann	aratusos	
Systematic title based	on use descript	o.r	Consumer use of CO ₂ absorbent in breathing apparatuses SU21, PC2, ERC8b				
Processes, tasks activ	vition onvered	01	Filling of the formulation into the cartridge				
FIDCesses, lasks acti	villes covereu		Use of closed circuit b				
		Cleaning of equipment		pparatuses			
Assessment Method*			Human health				
Assessment method			A qualitative assessme	ent has he	en performed for	oral and dermal	
		exposure. The inhalati					
			model (van Hemmen,			····	
			Environment	,			
			A qualitative justification	on assessr	ment is provided.		
2. Operational c	onditions an	d risk	c management m	neasure	es		
RMM			available in granular forr			mount of water (14-	
						nt. During the breathing	
			ydroxide will be quickly				
PC/ERC	Descript	ion of a	ctivity referring to artic	cle catego	ries (AC) and en	vironmental release	
	categorie	es (ERC)	-			
PC 2	Use of clo	osed circ	uit breathing apparatus	for e.g. re	creational diving	containing soda lime as	
	CO ₂ abso	orbent. T	he breathed air will flow	through th	ne absorbent and	CO ₂ will quickly react	
			er and sodium hydroxid				
			O ₂ -free air can be re-bre				
			bsorbent: The absorben	t will be di	scarded after eac	h use and refilled before	
	each dive						
ERC 8b			ndoor use resulting in in	clusion int	o or onto a matrix		
2.1 Control of co	onsumers ex	posu	re				
Product characteristic	;						
Description of the	Concentration	of the	Physical state of	Dustine	ess (if relevant)	Packaging design	
preparation	substance in the	ne	the preparation				
	preparation		.				
CO ₂ absorbent	78 - 84%		Solid, granular		v dustiness	4.5, 18 kg canister	
	Depending on the			(reduction by 10 % compared to powder) Dust formation cannot			
	application the r component has	nain					
	different additive	20		be ruled out during the			
	A specific amou			filling of the scrubber			
	water is always			cartridge			
	(14-18%).	aaaoa		calling			
"Used" CO2 absorbent	~ 20%		Solid, granular	Verv low	v dustiness	1-3 kg in breathing	
					on by 10 %	apparatus	
					ed to powder)		
Amounts used							
CO ₂ -Absorbent used in	breathing apparat	tus	1-3 kg depending on th	he kind of	breathing apparat	us	
Frequency and duration	on of use/exposu	ire					
Description of the task	(Durati	on of exposure per eve		frequency of e		
Filling of the formulation			33 min per filling, in sum			ve (up to 4 times)	
cartridge		min					
Use of closed circuit bre	eathing	1-2 h			Up to 4 dives a	day	
apparatus							
Cleaning and emptying		< 15 m			After each dive	(up to 4 times)	
Human factors not infl				E	dhadaa i	0	
Description of the	Population exp	osed	Breathing rate	Expose	d body part	Corresponding skin	
task	odult		1 05 m3/br /limbt	borde		area [cm ²]	
Filling of the	adult		1.25 m ³ /hr (light	hands		840 (REACH quidance	
formulation into the cartridge			working activity)			(REACH guidance R.15, men)	
Use of closed circuit	1			-		-	
breathing apparatus				-			
Cleaning and	1			hands		840	
emptying of				nanus		(REACH guidance	
equipment						R.15, men)	
	1			1		,	



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Other given operati	onal condition	ons affecting consume	ers expo	osure					
Description of the t	ask	Indoor/outdoor		Room volume	Air exchange rate				
Filling of the formulat cartridge	tion into the	NR		NR	NR				
Use of closed circuit apparatus	breathing	-		-	-				
Cleaning and emptyi equipment	ng of	NR		NR	NR				
	Conditions and measures related to information and behavioural advice to consumers								
		clothing. Do not breathe o							
Keep container tightl Keep out of reach of	y closed as to children.	avoid the soda lime to d							
Wash thoroughly after		immodiately with planty	ofwoto	r and seek medical advice.					
Do not mix with acids		infinediately with plenty (UI Wale	i and seek medical advice.					
Carefully read the ins	structions of t	he breathing apparatus to	o assur	e a proper use of the breathin	g apparatus.				
		d to personal protectio							
149).			g handl	ing. Use a filtering half mask (mask type FFP2 acc. to EN				
		nental exposure							
Product characteris									
Not relevant for expo	sure assessr	nent							
Not relevant for expo	sure assessr	nent							
Frequency and dura									
Not relevant for expo		nent							
		ced by risk managemei	nt						
Default river flow and									
	onal condition	ons affecting environme	ental ex	xposure					
Indoor		d to municipal company	two of we	ant alant					
		ed to municipal sewage system/treatment plant ar							
		d to external treatment							
Not relevant for expo									
		d to external recovery	of was	ite					
Not relevant for expo									
		and reference to) its s	ource					
The risk characterisa effect level) and is gi substances of 4 mg/r	tion ratio (RC ven in parent m³ (as respira	R) is the quotient of the r neses below. For inhalation ble dust) and the respect	refined ion expo tive inha	exposure estimate and the re osure, the RCR is based on th alation exposure estimate (as tion is a sub-fraction of the inl	e acute DNEL for lime inhalable dust). Thus, the				
EN 481.	-			a qualitative assessment has	_				
exposure and expose Due to the very spec			g their c	own CO ₂ scrubber) it can be a	ssumed that instructions will				
be taken into accoun				,					
Human exposure									
Filling of the formu Route of	Exposure e		Moth	ad used comments					
exposure	Exposure	estimate	weine	od used, comments					
Oral	-		Qualit	tative assessment					
			Oral e use.	exposure does not occur as pa	art of the intended product				
Dermal	-			tative assessment					
				reduction measures are taker					
				sure is expected. However, de ng of granular soda lime or dire					
				of be excluded if no protective					
			applic	ation. This may occasionally i	esult in mild irritation easily				
				ed by prompt rinsing with wate	er.				
Eye	Dust			tative assessment	into appount no human				
				reduction measures are taker sure is expected. Dust from loa					
				s expected to be minimal, ther					
			minim	al even without protective goo	ggles. Nevertheless, prompt				
				g with water and seeking med	ical advice after accidental				
			expos	sure is advisable.					



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Inhalation	Small task: $1.2 \ \mu g/m^3 (3 \times 10^{-4})$	Quantitative assessment
	Large task: 12 µg/m ³ (0.003)	Dust formation while pouring the powder is addressed by using the dutch model (van Hemmen, 1992, as described in section
		9.0.3.1 above) and applying a dust reduction factor of 10 for the
		granular form.
Use of closed c	ircuit breathing apparatus	
Route of	Exposure estimate	Method used, comments
exposure		
Oral	-	Qualitative assessment
		Oral exposure does not occur as part of the intended product
Dermal		use. Qualitative assessment
Dennar	-	Due to the product characteristics, it can be concluded that
		dermal exposure to the absorbent in breathing apparatuses is
		non-existent.
Eye	-	Qualitative assessment
		Due to the product characteristics, it can be concluded that eye
		exposure to the absorbent in breathing apparatuses is non-
Inholotion	nonligible	existent.
Inhalation	negligible	Qualitative assessment
		Instructional advice is provided to remove any dust before finishing the assembly of the scrubber. Divers filling their own
		CO_2 scrubber represent a specific subpopulation within
		consumers. Proper use of equipment and materials is in their
		own interest; hence it can be assumed that instructions will be
		taken into account.
		Due to the product characteristics and the instructional advices
		given, it can be concluded that inhalation exposure to the
		absorbent during the use of the breathing apparatus is
		negligible.
Cleaning and e	motving of equipment	
	mptying of equipment Exposure estimate	Method used, comments
Cleaning and en Route of exposure		Method used, comments
Route of		Qualitative assessment
Route of exposure		Qualitative assessment Oral exposure does not occur as part of the intended product
Route of exposure Oral	Exposure estimate	Qualitative assessment Oral exposure does not occur as part of the intended product use.
Route of exposure		Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment
Route of exposure Oral	Exposure estimate	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human
Route of exposure Oral	Exposure estimate	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from
Route of exposure Oral	Exposure estimate	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during
Route of exposure Oral	Exposure estimate	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with
Route of exposure Oral	Exposure estimate	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may
Route of exposure Oral	Exposure estimate	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate
Route of exposure Oral Dermal	Exposure estimate - Dust and splashes	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water.
Route of exposure Oral Dermal	Exposure estimate	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water. Qualitative assessment
Route of exposure Oral Dermal	Exposure estimate - Dust and splashes	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water. Qualitative assessment If risk reduction measures are taken into account no human
Route of exposure Oral Dermal	Exposure estimate - Dust and splashes	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, contact to dust from emptying
Route of exposure Oral Dermal	Exposure estimate - Dust and splashes	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water. Qualitative assessment If risk reduction measures are taken into account no human
Route of exposure Oral Dermal	Exposure estimate - Dust and splashes	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, contact to dust from emptying granular soda limes or during the cleaning of the cartridge with water contact to moisten soda limes may occur in very rare
Route of exposure Oral Dermal	Exposure estimate - Dust and splashes Dust and splashes	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, contact to dust from emptying granular soda limes or during the cleaning of the cartridge with
Route of exposure Oral Dermal Eye	Exposure estimate - Dust and splashes Dust and splashes Dust and splashes Small task: 0.3 μg/m³ (7.5 × 10 ⁻⁵)	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, contact to dust from emptying granular soda limes or during the cleaning of the cartridge with water contact to moisten soda limes may occur in very rare occasions. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Quantitative assessment
Route of exposure Oral Dermal Eye	Exposure estimate - Dust and splashes Dust and splashes	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, contact to dust from emptying granular soda limes or during the cleaning of the cartridge with water contact to moisten soda limes may occur in very rare occasions. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Quantitative assessment Dust formation while pouring the powder is addressed by using
Route of exposure Oral	Exposure estimate - Dust and splashes Dust and splashes Dust and splashes Small task: 0.3 μg/m³ (7.5 × 10 ⁻⁵)	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, contact to dust from emptying granular soda limes or during the cleaning of the cartridge with water contact to moisten soda limes may occur in very rare occasions. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Quantitative assessment Dust formation while pouring the powder is addressed by using the Dutch model (van Hemmen, 1992, as described in section
Route of exposure Oral Dermal Eye	Exposure estimate - Dust and splashes Dust and splashes Dust and splashes Small task: 0.3 μg/m³ (7.5 × 10 ⁻⁵)	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, contact to dust from emptying granular soda limes or during the cleaning of the cartridge with water contact to moisten soda limes may occur in very rare occasions. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Quantitative assessment Dust formation while pouring the powder is addressed by using the Dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above) and applying a dust reduction factor of 10 for the
Route of exposure Oral Dermal Eye	Exposure estimate - Dust and splashes Dust and splashes Dust and splashes Small task: 0.3 μg/m³ (7.5 × 10 ⁻⁵)	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, contact to dust from emptying granular soda limes or during the cleaning of the cartridge with water contact to moisten soda limes may occur in very rare occasions. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Quantitative assessment Dust formation while pouring the powder is addressed by using the Dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above) and applying a dust reduction factor of 10 for the granular form and a factor of 4 to account for the reduced
Route of exposure Oral Dermal Eye	Exposure estimate - Dust and splashes Dust and splashes Dust and splashes Small task: 0.3 µg/m³ (7.5 × 10 ⁻⁵) Large task: 3 µg/m³ (7.5 × 10 ⁻⁴)	Qualitative assessment Oral exposure does not occur as part of the intended product use. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water. Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, contact to dust from emptying granular soda limes or during the cleaning of the cartridge with water contact to moisten soda limes may occur in very rare occasions. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable. Quantitative assessment Dust formation while pouring the powder is addressed by using the Dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above) and applying a dust reduction factor of 10 for the

wastewater treatment plant is often neutralized anyway and lime may even be used beneficially for pH control of acid wastewater streams that are treated in biological WWTPs. Since the pH of the influent of the municipal treatment plant is circum neutral, the pH impact is negligible on the receiving environmental compartments, such as surface water, sediment and terrestrial compartment.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.14: Consumer use of garden lime/fertilizer

								_	
Exposure Scenario	Forma	at (2) ad	dressin	ig uses carrie	ed out l	by consu	mers		
1. Title									
Free short title				Consumer use			tilizer		
Systematic title based			tor	SU21, PC20, PC12, ERC8e					
Processes, tasks activities covered			Manual applic Post-application			e, fertilizer			
Assessment Method*			Human health		Juio				
						ent has be	en perform	ed for	oral and dermal
				exposure as v	vell as fo	or the expo	sure to the	eye	The dust exposure has
				been assesse	d by the	Dutch mo	del (van He	emme	n, 1992).
				Environment				اممام،	
0. Our sup the set is a				A qualitative j			nent is pro	/ided.	
2. Operational con	naitio								
RMM		No produ	ict integi	rated risk mana	gement	measures a	are in place). •	
PC/ERC					g to arti	cle catego	ries (AC)	and e	nvironmental release
PC 20		categori	es (ERC	•) a of the aerden	lime by	abovol/bor	d (worst o		nd soil incorporation.
		Post-app	lication	exposure to play	ying chile	dren.		,	
PC 12				g of the garden exposure to pla			nd (worst c	ase) a	and soil incorporation.
ERC 8e		Wide dis	persive o	outdoor use of r			in open s	/stem	S
2.1 Control of cor	isume	ers exp	osure						
Product characteristic)								
Description of the		entratior		Physical stat		Dustine	ss (if relev	ant)	Packaging design
preparation		tance in t aration	he	the preparati					
Garden lime	100 %	6		Solid, powder		High dus	sty		Bulk in bags or
									containers of 5, 10 and 25 kg
Fertilizer	Up to	20 %		Solid, granular		Low dusty			Bulk in bags or
									containers of 5, 10 and 25 kg
Amounts used				1	20 Ng				
Description of the pre	paratio	n		Amount used per event Source			ce of	information	
Garden lime				100g /m ² (up to 200g/m ²)		n²)	Information and direction of u		and direction of use
Fertilizer)) Inforr	Information and direction of use	
Frequency and duration		se/expos							
Description of the tas	k		Durati	on of exposure per event frequenc					
Manual application			Depen	es-hours Inding on the size of the treated		1 tasks per year			
Deet englie d'ar			area	ddlers playing on grass (EPA		Relevant for up to 7 days after			
Post-application			expos	ure factors hand		(EPA	applicatio		o to 7 days after
Human factors not inf	luence	d by risk	manage		4-	L E	11		0
Description of the	Popu	lation ex	posed	Breathing ra	te	⊨xpose	d body pa	τ	Corresponding skin
task Manual application	Adult			1.05 m3/br		Hondo o	nd forcorm		area [cm ²] 1900 (DIY fact sheet)
Manual application Post-application		/Toddlers		1.25 m ³ /hr NR		NR	nd forearm	3	NR
Other given operation			fecting		nosure				
Description of the tas			or/outdo			volume		Air	exchange rate
Manual application		outdo				personal sp	ace,	NR	
						area aroun			
Post-application		outdo	or		NR			NR	
Conditions and measure	ures re			on and behavi		lvice to co	nsumers		
Do not get in eyes, on s Keep container closed a In case of contact with Wash thoroughly after h	and out eyes, rii	of reach	of childre	en.		•		k type	e FFP2 acc. to EN 149).
Do not mix with acids a Incorporation of the gar	nd alwa	ays add lir					vill facilitate	the e	effect.
Conditions and measure							···· raointatt		
Wear suitable gloves					. ingener				

Wear suitable gloves, goggles and protection clothes.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

2.2 Control of a	environmental exposu	Iro	
Product characteris			
	t-case estimate based on dat	ta from dust measurer	ments in air as a function of the distance from
application)			
Amounts used			
Amount used	Ca(OH)2	2,244 kg/ha	In professional agricultural soil protection, it is
	CaO	1,700 kg/ha	recommended not to exceed 1700 kg CaO/ha
	CaO.MgO	1,478 kg/ha	or the corresponding amount of 2244 kg
	Ca(OH)2.Mg(OH)2	2,030 kg/ha	Ca(OH) ₂ /ha. This rate is three times the amount
	CaCO3.MgO	2,149 kg/ha	needed to compensate the annual losses of
	Ca(OH)2.MgO	1,774 kg/ha	lime by leaching. For this reason, the value of
	Natural hydraulic lime	2,420 kg/ha	1700 kg CaO/ha or the corresponding amount
		2,420 kg/na	of 2244 kg Ca(OH) ₂ /ha is used in this dossier as
			the basis for the risk assessment. The amount
			used for the other lime variants can be
			calculated based on their composition and the
			molecular weight.
Frequency and dura	ation of use		
		lications during the ve	ar are allowed, provided the total yearly amount of 2,244
kg/ha is not exceede			and another, provided the total yearly amount of 2,244
0	· /	anagamant	
	s not influenced by risk ma	anayement	
Not relevant for expo			
	onal conditions affecting e	environmental expos	ure
Outdoor use of produ			
Soil mixing depth: 20) cm		
Technical condition	ns and measures at proces	s level (source) to p	revent release
	eleases to adjacent surface		
			air emissions and releases to soil
Drift should be minim		or mine alcornargoo,	
		al aquiana traatmant	nlant
	easures related to municipa	al sewage treatment	piant
Not relevant for expo			
	easures related to external	treatment of waste	or disposal
Not relevant for expo			
	easures related to external	recovery of waste	
Not relevant for expo			
3. Exposure es	timation and referenc	e to its source	
	ation ratio (RCR) is the quoti	ent of the refined expo	osure estimate and the respective DNFL (derived no-
			osure estimate and the respective DNEL (derived no-
effect level) and is g	iven in parentheses below. F	For inhalation exposur	e, the RCR is based on the long-term DNEL for lime
effect level) and is g substances of 1 mg/	iven in parentheses below. F /m ³ (as respirable dust) and t	For inhalation exposur the respective inhalation	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the
effect level) and is g substances of 1 mg/ RCR includes an ad	iven in parentheses below. F /m ³ (as respirable dust) and t	For inhalation exposur the respective inhalation	e, the RCR is based on the long-term DNEL for lime
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481.	iven in parentheses below. F /m³ (as respirable dust) and t lditional safety margin since t	For inhalation exposur the respective inhalation the respirable fraction	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc	iven in parentheses below. F /m ³ (as respirable dust) and t lditional safety margin since t res are classified as irritating	For inhalation exposur the respective inhalation the respirable fraction	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos	iven in parentheses below. F /m ³ (as respirable dust) and t lditional safety margin since t res are classified as irritating	For inhalation exposur the respective inhalation the respirable fraction	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure	iven in parentheses below. F /m ³ (as respirable dust) and t lditional safety margin since t ses are classified as irritating sure to the eye.	For inhalation exposur the respective inhalation the respirable fraction	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application	iven in parentheses below. F /m ³ (as respirable dust) and t lditional safety margin since t ses are classified as irritating sure to the eye.	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of	iven in parentheses below. F /m ³ (as respirable dust) and t lditional safety margin since t ses are classified as irritating sure to the eye.	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure	iven in parentheses below. F /m ³ (as respirable dust) and t ditional safety margin since t es are classified as irritating sure to the eye.	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu Method us	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of	iven in parentheses below. F /m ³ (as respirable dust) and t lditional safety margin since t ses are classified as irritating sure to the eye.	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu Method us Qualitative	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure	iven in parentheses below. F /m ³ (as respirable dust) and t ditional safety margin since t es are classified as irritating sure to the eye.	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu Method us Qualitative Oral expos	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure Oral	iven in parentheses below. F m ³ (as respirable dust) and t ditional safety margin since t sure to the eye. Exposure estimate	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu Method us Qualitative Oral exposure.	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments assessment sure does not occur as part of the intended product
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure	iven in parentheses below. F /m ³ (as respirable dust) and t ditional safety margin since t es are classified as irritating sure to the eye.	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu Method us Qualitative Oral exposuse. Qualitative	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments assessment ure does not occur as part of the intended product assessment
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure Oral	iven in parentheses below. F m ³ (as respirable dust) and t ditional safety margin since t sure to the eye. Exposure estimate	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu Method us Qualitative Oral exposuse. Qualitative If risk redu	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments assessment sure does not occur as part of the intended product assessment ction measures are taken into account no human
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure Oral	iven in parentheses below. F m ³ (as respirable dust) and t ditional safety margin since t sure to the eye. Exposure estimate	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu Method us Qualitative Oral expos use. Qualitative If risk redu exposure i	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments assessment sure does not occur as part of the intended product assessment ction measures are taken into account no human s expected. However, dermal contact to dust from
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure Oral	iven in parentheses below. F m ³ (as respirable dust) and t ditional safety margin since t sure to the eye. Exposure estimate	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu Method us Oral exposi- use. Qualitative If risk redu exposure i application	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments assessment sure does not occur as part of the intended product assessment ction measures are taken into account no human s expected. However, dermal contact to dust from of lime substances or by direct contact to the limes
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure Oral	iven in parentheses below. F m ³ (as respirable dust) and t ditional safety margin since t sure to the eye. Exposure estimate	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu Method us Oral exposure If risk redu exposure i application cannot be	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments assessment sure does not occur as part of the intended product assessment ction measures are taken into account no human s expected. However, dermal contact to dust from of lime substances or by direct contact to the limes excluded if no protective gloves are worn during
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure Oral	iven in parentheses below. F m ³ (as respirable dust) and t ditional safety margin since t sure to the eye. Exposure estimate	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu Method us Qualitative Oral exposuse. Qualitative If risk redu exposure i application cannot be application	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments assessment sure does not occur as part of the intended product assessment ction measures are taken into account no human s expected. However, dermal contact to dust from of lime substances or by direct contact to the limes excluded if no protective gloves are worn during b. Due to the relatively long application time, skin
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure Oral	iven in parentheses below. F m ³ (as respirable dust) and t ditional safety margin since t sure to the eye. Exposure estimate	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu Method us Qualitative Oral exposuse. Qualitative If risk redu exposure i application cannot be application irritation w	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments assessment sure does not occur as part of the intended product assessment ction measures are taken into account no human s expected. However, dermal contact to dust from of lime substances or by direct contact to the limes excluded if no protective gloves are worn during build be expected. This can easily be avoided by
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure Oral	iven in parentheses below. F m ³ (as respirable dust) and t ditional safety margin since t sure to the eye. Exposure estimate	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a qu Method us Qualitative Oral exposures Use. Qualitative If risk redu exposure i application cannot be application irritation wi	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments assessment sure does not occur as part of the intended product assessment ction measures are taken into account no human is expected. However, dermal contact to dust from of lime substances or by direct contact to the limes excluded if no protective gloves are worn during b. Due to the relatively long application time, skin ould be expected. This can easily be avoided by rinsing with water. It would be assumed that
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure Oral	iven in parentheses below. F m ³ (as respirable dust) and t ditional safety margin since t sure to the eye. Exposure estimate	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a que Method us Qualitative Oral exposures Use. Qualitative If risk redu exposure i application irritation we immediate consumers	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments assessment cure does not occur as part of the intended product assessment ction measures are taken into account no human is expected. However, dermal contact to dust from of lime substances or by direct contact to the limes excluded if no protective gloves are worn during build be expected. This can easily be avoided by rinsing with water. It would be assumed that is who had experience of skin irritation will protect
effect level) and is g substances of 1 mg/ RCR includes an ad EN 481. Since lime substanc exposure and expos Human exposure Manual application Route of exposure Oral	iven in parentheses below. F m ³ (as respirable dust) and t ditional safety margin since t sure to the eye. Exposure estimate	For inhalation exposur the respective inhalation the respirable fraction to skin and eyes a que Method us Qualitative Oral exposures Use. Qualitative If risk redu exposure i application irritation we immediate consumers	e, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the is a sub-fraction of the inhalable fraction according to alitative assessment has been performed for dermal sed, comments assessment sure does not occur as part of the intended product assessment ction measures are taken into account no human is expected. However, dermal contact to dust from of lime substances or by direct contact to the limes excluded if no protective gloves are worn during b. Due to the relatively long application time, skin ould be expected. This can easily be avoided by rinsing with water. It would be assumed that



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Eye	Dust	Qualitative assessment
		If risk reduction measures are taken into account no human
		exposure is expected. Dust from surfacing with lime cannot be
		excluded if no protective goggles are used. Prompt rinsing with
		water and seeking medical advice after accidental exposure is
		advisable.
Inhalation (garden	Small task: 12 µg/m ³ (0.0012)	Quantitative assessment
lime)	Large task: 120 µg/m ³ (0.012)	No model describing the application of powders by shovel/hand
		is available, therefore, read-across from the dust formation model
		while pouring powders has been used as a worst case.
		Dust formation while pouring the powder is addressed by using
		the dutch model (van Hemmen, 1992, as described in section
		9.0.3.1 above).
Inhalation	Small task: 0.24 µg/m ³ (2.4 * 10 ⁻⁴)	Quantitative assessment
(fertilizer)	Large task: 2.4 µg/m ³ (0.0024)	No model describing the application of powders by shovel/hand
		is available, therefore, read across from the dust formation model
		while pouring powders has been used as a worst case.
		Dust formation while pouring the powder is addressed by using
		the dutch model (van Hemmen, 1992, as described in section
		9.0.3.1 above) and applying a dust reduction factor of 10 for the
		granular form and a factor of 5 to account for the reduced amount
		of limes in fertilizer.
Post-application		
According to the PS	D (UK Pesticide Safety Directorate, no	ow called CRD) post-application exposure need to be addressed
		ts used to treat lawns and plants grown in private gardens. In this
		areas soon after treatment, needs to be assessed. The US EPA
		used in private gardens (e.g. lawns) by toddlers crawling on the
treated area and als	o via the oral route through hand-to-m	nouth activities.
Garden lime or fertil	izer including lime is used to treat acid	lic soil. Therefore, after application to the soil and subsequent
watering the hazard	driving effect of lime (alkalinity) will be	e quickly neutralized. Exposure to lime substances will be negligible
within a short time a	itter application.	

Environmental exposure

No quantitative environmental exposure assessment is carried out because the operational conditions and risk management measures for consumer use are less stringent than those outlined for professional agricultural soil protection. Moreover, the neutralisation/pH-effect is the intended and desired effect in the soil compartment. Releases to wastewater are not expected.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.15: Consumer use of lime substances as water treatment chemicals

Exposure Scenario	Forma	t (2) add	lressin	g uses carrie	d out by	consu	ners	
1. Title								
Free short title				Consumer use	e of lime s	ubstance	s as water treat	ment chemicals
Systematic title based on use descriptor				SU21, PC20, I	PC37, ER	C8b		
Processes, tasks activ				Loading, filling	or re-fillir	ng of solid	formulations ir	to container/preparation
				of lime milk		0		
			Application of	lime milk t	to water			
Assessment Method*				Human health				
				A qualitative a	ssessmer	nt has be	en performed fo	r oral and dermal
				exposure as w	ell as for	exposure	of the eye. Dus	t exposure has been
							an Hemmen, 19	
				Environment:		,		,
				A qualitative ju	ustification	assessn	nent is provided	
2. Operational co								
RMM				t integrated risk				
PC/ERC					to article	e catego	ries (AC) and e	nvironmental release
		categori						
PC 20/37								tor for water treatment.
		Transfer	of lime s	ubstances (solid	d) into con			
				tion of lime milk				
ERC 8b		Wide dis	persive i	ndoor use of rea	active sub	stances i	n open systems	
2.1 Control of co	onsum	ners ex	posu	re				
Product characteristic								
Description of the		ntration	of the	Physical stat	e of	Dustine	ss (if relevant)	Packaging design
preparation		ance in t		the preparati		Dustine	ss (in relevant)	r ackaging acsign
preparation	prepar			the preparation				
Water treatment	Up to 2			Solid find nov	vdor	high dus	tinocc	Bulk in bags or
chemical	Op to	100 %	Solid, fine powder		vuei			buckets/containers.
chemical						(indicative value from DIY fact sheet see		buckets/containers.
						section 9.0.3)		
		0.07		O all'al anno avala	(/	Bully to all long to an in
Water treatment	Up to 9	99 %		Solid, granula	r of			Bulk-tank lorry or in
chemical				different size	-	(reduction by 10% compared to powder)		"Big Bags" or in sacks
				(D50 value 0.7				
				D50 value 1.7				
	l		_	D50 value 3.0	8)			
Amounts used								
Description of the prep				Amount used				
Water treatment chemic	al in lime	e reactor	for	depending on	the size o	f the wate	er reactor to be	filled (~ 100g /L)
aquaria								
Water treatment chemic	al in lime	e reactor	for	depending on	the size o	f the wate	er reactor to be	filled (~up to 1.2 kg/L)
drinking water								
Lime milk for further app	lication	_		~ 20 g / 5L				
Frequency and duratio	on of us	e/exposi						
Description of task						frequency of events		
Preparation of lime milk	(loading	, filling	1.33 m				1 task/month	
and refilling)				act sheet, RIVM,		2.4.2	1task/week	
				and loading of				
		< to	Severa	al minutes - hour	rs		1 tasks/ montl	า
Dropwise application of	lime mill							
water								
Human factors not infl	uenced	by risk I	nanage					-
water	uenced		<mark>manage</mark> posed	<mark>ment</mark> Breathing rat	te	Expos	ed body part	Corresponding skin
water Human factors not infl Description of the task	uenced	by risk I	manage bosed		te			Corresponding skir area [cm²]
water Human factors not infl Description of the task	uenced	by risk I	manage posed		te		ed body part	
water Human factors not infl Description of the task Preparation of lime	uenced Popula	by risk I	manage posed	Breathing rat	e			area [cm ²]
water Human factors not infl Description of the task Preparation of lime milk (loading, filling	uenced Popula	by risk I	manage posed	Breathing rat	te			area [cm²] 430
water Human factors not infl Description of the task Preparation of lime milk (loading, filling and refilling)	uenced Popula	by risk I	manage posed	Breathing rat	e			area [cm²] 430 (RIVM report
water Human factors not infl Description of the task Preparation of lime milk (loading, filling	uenced Popula adult	by risk I	manage posed	Breathing rat	ie	Half of		area [cm ²] 430 (RIVM report 320104007)
water Human factors not infl Description of the task Preparation of lime milk (loading, filling and refilling) Dropwise application	uenced Popula adult	by risk I	manage posed	Breathing rat	ie	Half of		area [cm²] 430 (RIVM report 320104007) 860 (RIVM report
water Human factors not infl Description of the task Preparation of lime milk (loading, filling and refilling) Dropwise application of lime milk to water	uenced Popula adult adult	by risk n ation exp	bosed	Breathing rat		Half of		area [cm²] 430 (RIVM report 320104007) 860
water Human factors not infl Description of the task Preparation of lime milk (loading, filling and refilling) Dropwise application of lime milk to water Other given operation	uenced Popula adult adult al condi	by risk n ation exp	ecting	Breathing rat 1.25 m ³ /hr NR consumers exp	oosure	Half of Hands	both hands	area [cm²] 430 (RIVM report 320104007) 860 (RIVM report 320104007)
water Human factors not infl Description of the task Preparation of lime milk (loading, filling and refilling) Dropwise application	adult adult adult	by risk i ation exp tions aff	bosed	Breathing rat 1.25 m ³ /hr NR consumers expoor	osure Room v	Half of Hands	both hands	430 (RIVM report 320104007) 860 (RIVM report



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision	date:	September,	/2010
----------	-------	------------	-------

Droputing and the t	oflices	indoor		ND		ND
Dropwise application milk to water	of lime	indoor		NR		NR
Conditions and mea	asuros rolato	d to information an	d behavio	ural advice to	consumers	
Do not get in eyes, o Keep container close	n skin, or on o	clothing. Do not breat			Jonsumers	
Use only with adequa In case of contact with	ate ventilation		onty of wat	ar and sook mor	lical advica	
Wash thoroughly after Do not mix with acids	er handling.					
Conditions and me						
Wear suitable gloves	, goggles and	protective clothes. L	Jse a filter	ing half mask (m	ask type FFP2	2 acc. to EN 149).
2.2 Control of	environm					
Product characteris	stics					
Not relevant for expo	sure assessn	nent				
Not relevant for expo	sure assess	nent				
Frequency and dura						
Not relevant for expo		nent				
Environment factor		ced by risk manage	ement			
Default river flow and						
Other given operati	onal condition	ons affecting enviro	nmental e	xposure		
Indoor		d to municipal cours		saut plant		
Conditions and means Default size of munic					chnique	
Conditions and me						
Not relevant for expo						
Conditions and me			very of wa	ste		
Not relevant for expo						
3. Exposure es	stimation	and reference	e to its :	source		
substances of 4 mg/r RCR includes an add EN 481.	m ³ (as respira ditional safety es are classifi	ble dust) and the res margin since the res ed as irritating to skin	pective in pirable fra	nalation exposur ction is a sub-fra	e estimate (as action of the in	ne acute DNEL for lime inhalable dust). Thus, the halable fraction according to been performed for dermal
Human exposure						
Preparation of lime	milk (loadin	g)				
Route of	Exposure		Meth	od used, com	nents	
exposure						
Oral	-			itative assessme exposure does r		art of the intended product
Dermal (powder)	small task: large task:	0.1 μg/cm² (-) 1 μg/cm² (-)	If risk expo loadi if no occa rinsir Quar The conta taker	sure is expected ng of limes or di protective glove sionally result in ng with water. ntitative assess constant rate mo act rate to dust fo	sures are taken I. However, de rect contact to s are worn dur mild irritation hent odel of ConsEx ormed while pr act sheet (RIVI	n into account no human ermal contact to dust from the lime cannot be excluded ing application. This may easily avoided by prompt easily avoided by prompt whether the seen used. The puring powder has been M report 320104007). For I be even lower.
Eye	Dust		If risk expo exclu wate	sure is expected ided if no protec	sures are take I. Dust from loa tive goggles a	n into account no human ading of the limes cannot be re used. Prompt rinsing with after accidental exposure is
Inhalation (powder)		12 μg/m³ (0.003) 120 μg/m³ (0.03)	Quar Dust the D	ntitative assessn formation while	pouring the po	owder is addressed by using 92, as described in section



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

Inhalation	Small task: 1.2 µg/m ³ (0.0003)	Quantitative assessment
(granules)	Large task: 12 µg/m ³ (0.003)	Dust formation while pouring the powder is addressed by using
		the Dutch model (van Hemmen, 1992 as described in section
		9.0.3.1 above) and applying a dust reduction factor of 10 for the granular form.
Dropwise appli	cation of lime milk to water	
Route of	Exposure estimate	Method used, comments
exposure		
Oral	-	Qualitative assessment
		Oral exposure does not occur as part of the intended product
		use.
Dermal	Droplets or splashes	Qualitative assessment
		If risk reduction measures are taken into account no human
		exposure is expected. However, splashes on the skin cannot be
		excluded if no protective gloves are worn during application.
		Splashes may occasionally result in mild irritation easily avoided
		by immediate rinsing of the hands in water.
Eye	Droplets or splashes	Qualitative assessment
		If risk reduction measures are taken into account no human
		exposure is expected. However, splashes into the eyes cannot
		be excluded if no protective goggles are worn during the
		application.
		However, it is rare for eye irritation to occur as a result of exposure to a clear solution of calcium hydroxide (lime water)
		and mild irritation can easily be avoided by immediate rinsing of
		the eyes with water.
Inhalation		Qualitative assessment
malation		Not expected, as the vapour pressure of limes in water is low
		and generation of mists or aerosols does not take place.
Environmental	exposure	
		ed to be negligible. The influent of a municipal wastewater treatment
		used beneficially for pH control of acid wastewater streams that are
		t of the municipal treatment plant is circum neutral, the pH impact is

reated in biological WWTPs. Since the pH of the influent of the municipal treatment plant is circum neutral, the pH impact is negligible on the receiving environmental compartments, such as surface water, sediment and terrestrial compartment.



prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

Version: 1.0/EN

Revision date: September/2010

Printing Date: June/2019

ES number 9.16: Consumer use of cosmetics containing lime substances

Exposure Scenario Format (2) addressi	ng uses carried out by consumers			
1. Title				
Free short title	Consumer use of cosmetics containing limes			
Systematic title based on use descriptor	SU21, PC39, ERC8a			
Processes, tasks activities covered	-			
,	Human health:			
Assessment Method*	According to Article 14(5) (b) of regulation (EC) 1907/2006 risks to human health need not be considered for substances included in cosmetic products within the scope of Directive 76/768/EC. Environment			
2. Operational conditions and risk n	A qualitative justification assessment is provided.			
	indoor use of processing aids in open systems			
2.1 Control of consumers exposure				
Product characteristic	ie voe deee wet weedte he eensidened			
Not relevant, as the risk to human health from th				
Amounts used	sie waa daap not naad te be eensidered			
Not relevant, as the risk to human health from th				
Frequency and duration of use/exposure	sie waa daap not naad te be eensidered			
Not relevant, as the risk to human health from the				
Human factors not influenced by risk manag				
Not relevant, as the risk to human health from the				
Other given operational conditions affecting				
Not relevant, as the risk to human health from th				
Conditions and measures related to informat				
Not relevant, as the risk to human health from the				
Conditions and measures related to persona	I protection and hygiene			
Not relevant, as the risk to human health from the				
2.2 Control of environmental exposition	ure			
Product characteristics				
Not relevant for exposure assessment				
Amounts used*				
Not relevant for exposure assessment				
Frequency and duration of use				
Not relevant for exposure assessment				
Environment factors not influenced by risk n	nanagement			
Default river flow and dilution				
Other given operational conditions affecting	environmental exposure			
Indoor				
Conditions and measures related to municip				
Default size of municipal sewage system/treatment plant and sludge treatment technique				
Conditions and measures related to external treatment of waste for disposal				
Not relevant for exposure assessment				
Conditions and measures related to externa	I recovery of waste			
Not relevant for exposure assessment				
3. Exposure estimation and reference	ce to its source			
Human exposure				
Human exposure to cosmetics will be addressed (EC) 1907/2006 according to Article 14(5) (b) of	d by other legislation and therefore need not be addressed under regulation this regulation.			
Environmental exposure				
	s expected to be negligible. The influent of a municipal wastewater treatment			
	even be used beneficially for pH control of acid wastewater streams that are			
	e influent of the municipal treatment plant is circum neutral, the pH impact is			

treated in biological WWTPs. Since the pH of the influent of the municipal treatment plant is circum neutral, the pH impact is negligible on the receiving environmental compartments, such as surface water, sediment and terrestrial compartment.

End of the safety data sheet