Buzzi Unicem

SAFETY DATA SHEET
CEMENTS AND HYDRAULIC BINDERS

Issue date: 01/01/2023	Revision date: **01/01/2023 - rev. 0**

Section 1. IDENTIFICATION OF THE MIXTURE AND THE COMPANY

1.1 Product identifier: **Cement and/or cement-based powder mixture**, conforming to specific technical standards.

Cement Standard Formulas Name (according to (EU) 2020/1677)	**Standards** (equivalent)	**UFI**
Cement Standard Formula - 1 [Portland cement with a main constituent: clinker]	EN 197-1 - CEM I	2200-U0CW-500E-QU85
Cement Standard Formula - 2 [Slag cement and blast furnace cement with 2 main constituents: clinker and slag]	EN 197-1 - CEM II-S, CEM III	1500-C029-F00X-D5UV
Cement Standard Formula - 4 [Pozzolan Portland Cement, Pozzolanic Cement, Portland cements with two main constituents: clinker and pozzolan (natural or natural calcined pozzolan)]	EN 197-1 - CEM II-P, CEM II-Q, CEM IV-P, CEM IV-Q	7A00-C0F3-200W-QV16
Cement Standard Formula - 5 [Fly ash Portland cement, Pozzolanic Portland cement with two main constituents: clinker and fly ash (silica and limestone fly ash)]	EN 197-1 - CEM II-V, CEM II-W, CEM IV-V, CEM IV-W	TE00-V04G-D00E-C6MD
Cement Standard Formula - 7 [Limestone Portland cement, Portland cement with 2 main constituents: clinker and limestone]	EN 197-1 - CEM II-L and CEM II-LL	YK00-V0H9-000D-PVSN
Cement Standard Formula - 15	EN 197-1 CEM IV/A (P-V), CEM IV/B (P-V)	R810-X01F-F00C-YMFR
Calinto	EN 15368	8300-F076-G00M-AH9C
ECOSPRITZ Binders		TE00-F0YS-Q00K-YVMM
BASE PRONTAPRESA		NP00-001Y-N002-YWCT

1.2 Identified relevant uses of the mixture and uses advised against

The cement is used as a hydraulic binder for the manufacture of concrete, hydraulic mortar, plaster, etc.

Cements and hydraulic binders conforming to the product and chemical/physical requirements of technical standards EN 197-1, UNI EN 413-1, UNI EN 14216 and UNI EN 15368, are used in the industrial production of construction materials and by professionals as well as consumers in building and construction work.

The identified uses of cements and of mixtures containing cement (hydraulic binders) include both dry products and products in a wet suspension (paste).

PROC	Process categories - Identified uses	Producer / Formulation of building materials	Professional / Industrial Use of building materials
2	Use in closed and continuous process, with occasional controlled exposure	X	X
3	Use in closed batch process (synthesis or formulation)	X	X
5	Mixing or blending in batch process for formulation of preparations (*) and articles (contact in various phases and/or significant contact)	X	X
7	Industrial spraying		X
8a	Transfer of substance or preparation (*) (filling/emptying) from/to vessels/large containers at non-dedicated facilities		X
8b	Transfer of substance or preparation (*) (filling/emptying) from/to vessels/large containers at dedicated facilities	X	X
9	Transfer of substance or preparation (*) into small containers (dedicated filling line, including weighing)	X	X
10	Roller application or brushing		X
11	Non-industrial spraying		X
13	Treatment of articles by dipping and pouring		X
14	Production of preparations (*) or articles by tableting, compression, extrusion, pelletization	X	X
19	Hand mixing with intimate contact, only using personal protective equipment (PPE)		X
22	Potentially closed processing operations with minerals/metals at high temperature Industrial setting		X
26	Handling of solid inorganic substances at room temperature	X	X

(*) NB: In order to remain consistent with the descriptors system indicated in IUCLID 5.2, the term "preparation" was not replaced by the new definition of "mixture" in the table.

1.3 Details of the supplier of the Safety Data Sheet (SDS)

BUZZI UNICEM s.r.l.
Via Luigi Buzzi 6
15033 Casale Monferrato (AL)
tel. 0142 416411
e-mail of manager issuing the SDS: reach@buzziunicem.it

1.4 Emergency telephone number:

+39 0382 24444 - Pavia Poison Center *(see also Subsection 16.7)*
Available outside of business hours? ☒ YES 24 hours/day.

Section 2. HAZARDS IDENTIFICATION

2.1 Classification of the mixture

In accordance with Regulation (EC) No. 1272/2008 (CLP)

Hazard class	Hazard category	Risk phrases
Skin irritation	2	H315: causes skin irritation
Serious eye damage / eye irritation	1	H318: causes serious eye damage
Skin sensitization	1B	H317: may cause an allergic skin reaction
Specific target organ toxicity (single exposure) - STOT SE, respiratory tract irritation	3	H335: may cause respiratory irritation

2.2 Label elements

In accordance with Regulation (EC) No. 1272/2008 (CLP)

Warnings

Hazard

Risk phrases

H318: causes serious eye damage
H315: causes skin irritation
H317: may cause an allergic skin reaction
H335: may cause respiratory irritation

Safety phrases

P102:	Keep out of reach of children.
P280:	Wear protective gloves/clothing/eye protection/face protection
P305+P351+ P338+P310:	IF IN EYES: Rinse cautiously with water for several minutes. <Remove contact lenses, if present and easy to do; continue rinsing. If you feel unwell, contact a Poison Center or a doctor immediately.
P302+P352+ P333+P313:	IF ON SKIN: wash with plenty of soap and water; if skin irritation or rash occurs, seek medical advice/attention.
P261+P304+ P340+P312:	Avoid breathing in the dust. IF INHALED: remove the person to fresh air and keep at rest in a position comfortable for breathing. If they feel unwell, contact a Poison Center or a doctor.
P101:	If medical advice is needed, have product container or label at hand.
P501:	Dispose of product/containers in accordance with current regulations.

Additional information

Skin contact with wet cement, fresh concrete or mortar may cause irritation, dermatitis or burns.

May cause damage to products made of aluminum or other non-noble metals.

2.3 Other hazards

In the presence of water, for example when manufacturing concrete or mortar, or when it gets wet, cement produces a strong alkaline solution (high pH due to the formation of hydroxides of calcium, sodium and potassium).

Frequent inhalation of cement dust over a long period of time increases the risks of developing lung diseases (especially in case of repeated and prolonged exposure to airborne dust from formulations of the mixture possibly containing siliceous components *- for more details, see Subsection 15.1).*

Repeated and prolonged contact of cement and/or its pastes on moist skin (due to sweat or humidity) can cause irritation and/or dermatitis *[Reference (4)].*

Both cement and cement pastes, in case of prolonged contact with the skin, may cause sensitization and/or allergic reaction in some individuals due to the presence, in traces, of chromium (VI) salts; if necessary, this effect can be diminished by adding a specific reducing agent to keep the level of soluble chromium (VI) below the limit of 0.0002% (2 ppm) of the total dry weight of the cement itself, in accordance with the legislation specified under Section 15 *[Reference (3)].*

If large amounts are ingested, cement may cause ulcerations of the digestive system.

Under normal conditions of use, cement and cement pastes do not pose any particular risks to the environment, as long as the recommendations provided under Sections 6, 8, 12 and 13 are followed.

The cement does not meet the criteria for PBT or vPvB, in accordance with Annex XIII of Regulation 1907/2006/EC “REACH”.

Cement may contain respirable free crystalline silica.

Section 3. COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Substances

Not applicable

3.2 Mixtures

The common cement types are made in accordance with UNI EN 197-1 (see table below).

3.2.1 Components presenting a health hazard

Constituent	% In weight	EC number	CAS	"REACH" Registration no.	Classification according to Regulation 1272/2008/EC		
					Hazard class	Hazard category	Hazard statements
Portland cement clinker	**20÷100**	**266-043-4**	**65997-15-1**	**None (*)**	**Skin irritation** **Skin sensitization** **Eye damage** **STOT SE**	**2** **1B** **1** **3**	**H315** **H317** **H318** **H335**
Flue dust [filter (CKD) and by-pass (BPD) dust]	**0÷5**	**270-659-9**	**68475-76-3**	**01-2119486767-17-0018** (10/11/2010)	**Skin irritation** **Skin sensitization** **Eye damage** **STOT SE**	**2** **1B** **1** **3**	**H315** **H317** **H318** **H335**

(*) clinker: C&L Notification no. 02-2119682167-31-0000 dated 15 December 2010; updated on 1 July 2013 with presentation of Report no. QJ420702-40.

The clinker and *flue dust* content in the various types of cement is indicated in the table below, annexed to UNI EN ISO 197-1; the CKD (cement kiln dust) and/or BPD (by-pass dust) *(i.e., flue dust)*, if present in the formulation of the cement mixtures, is dosed as a secondary constituent.

Cement is an inorganic product, consisting of a finely ground mixture of clinker, gypsum and other specific constituents (limestone, pozzolan, blast furnace slag, fly ash, etc.), defined by specific technical standards.

The clinker, produced by a firing kiln at a temperature of about 1450 °C in sintered granular form, is an artificial mineral with several components, consisting mainly of calcium silicates, aluminates and aluminoferrites and of small quantities of calcium and magnesium oxide, sodium, potassium and calcium sulphates, as well as of traces of other compounds, including chromium (VI) salts.

Common cements are manufactured in compliance with the requirements of standard EN 197-1 *"Composition, specifications and conformity criteria for common cements"* as amended.

Hydraulic binders for non-structural applications (HBs) are produced in compliance with the requirements of UNI EN 15368 *"Non-structural construction hydraulic binder - Definition, specifications and conformity criteria".*

Very low heat cements (VLH) are produced according to standard UNI EN 14216 *"Cement - Composition, specifications and conformity criteria for very low heat special cements".*

Main types	Denomination of the 27 products (types of common cement)		Composition (mass percentage)[a]										
			Primary constituents										Secondary constituents
			Clinker	Blast furnace slag	Silica fumes	Pozzolan		Fly ash		Calcinated shale	Limestone		
			K	S	D[b]	natural P	natural calcinated Q	siliceous V	calcic W	T	L	LL	
CEM I	Portland cement	CEM I	95-100	-	-	-	-	-	-	-	-	-	0-5
CEM II	Portland slag cement	CEM II/A-S	80-94	6-20	-	-	-	-	-	-	-	-	0-5
		CEM II/B-S	65-79	21-35	-	-	-	-	-	-	-	-	0-5
	Portland cement with silica fumes	CEM II/A-D	90-94	-	6-10	-	-	-	-	-	-	-	0-5
	Portland pozzolanic cement	CEM II/A-P	80-94	-	-	6-20	-	-	-	-	-	-	0-5
		CEM II/B-P	65-79	-	-	21-35	-	-	-	-	-	-	0-5
		CEM II/A-Q	80-94	-	-	-	6-20	-	-	-	-	-	0-5
		CEM II/B-Q	65-79	-	-	-	21-35	-	-	-	-	-	0-5
	Portland fly ash cement	CEM II/A-V	80-94	-	-	-	-	6-20	-	-	-	-	0-5
		CEM II/B-V	65-79	-	-	-	-	21-35	-	-	-	-	0-5
		CEM II/A-W	80-94	-	-	-	-	-	6-20	-	-	-	0-5
		CEM II/B-W	65-79	-	-	-	-	-	21-35	-	-	-	0-5
	Portland calcinated shale cement	CEM II/A-T	80-94	-	-	-	-	-	-	6-20	-	-	0-5
		CEM II/B-T	65-79	-	-	-	-	-	-	21-35	-	-	0-5
	Portland limestone cement	CEM II/A-L	80-94	-	-	-	-	-	-	-	6-20	-	0-5
		CEM II/B-L	65-79	-	-	-	-	-	-	-	21-35	-	0-5
		CEM II/A-LL	80-94	-	-	-	-	-	-	-	-	6-20	0-5
		CEM II/B-LL	65-79	-	-	-	-	-	-	-	-	21-35	0-5
	Portland composite cement[c]	CEM II/A-M	80-94	6-20									0-5
		CEM II/B-M	65-79	21-35									0-5
CEM III	Blast furnace cement	CEM III/A	35-64	36-65									0-5
		CEM III/B	20-34	66-80									0-5
		CEM III/C	5-19	81-95									0-5
CEM IV	Pozzolanic cement[c]	CEM IV/A	65-89	-	11-35								0-5
		CEM IV/B	45-64	-	36-55								0-5
CEM V	Composite cement[c]	CEM V/A	40-64	18-30	-	18-30							0-5
		CEM V/B	20-38	31-50	-	31-50							0-5

[a] The value from the data sheet refer to the sum of primary and secondary constituents.

[b] The proportion of silica fumes is restricted to 10%.

[c] In the Portland composite cements CEM II/A-M and CEM II/B-M, in the pozzolanic cements CEM IV/A e CEM IV/B and in the composite cements CEM V/A e CEM V/B the primary constituents other than clinker must be declared in the cement denomination (see example in section 8).

Section 4. FIRST AID MEASURES

4.1 Description of first aid measures

General notes

No personal protective equipment is needed for first responders. First aid workers should avoid inhaling cement dust and contact with moist cement or preparations containing moist cement. If this is not possible, first aid workers must use the personal protective equipment described under Section 8.

In case of inhalation

Move the person to fresh air; dust in throat and nostrils should clear spontaneously. Contact a doctor if irritation persists, or later develops, or if discomfort, coughing or other symptoms persist.

Following skin contact

For dry cement, remove and rinse thoroughly with water. For wet/damp cement, wash the skin with plenty of water and pH neutral soap or a mild detergent. Remove contaminated clothing, footwear, glasses, watches, etc. and clean them thoroughly before using them again. Seek medical advice in all cases of irritation or burns.

Following contact with eyes

Do not rub eyes in order to avoid possible corneal damage by mechanical stress. Remove contact lenses if any. Tilt head to injured eye, open the eyelids wide and flush eye(s) immediately with plenty of water for at least 20 minutes to remove all particles; If possible, use isotonic water (0.9% NaCl).

If necessary, contact a specialist in occupational medicine or an eye specialist.

Following ingestion

Do not induce vomiting. If the person is conscious, wash out mouth with plenty of water; consult a doctor or contact a Poison Control Center immediately.

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

Eyes: eye contact with cement dust (dry or wet) may cause irritation or serious and potentially irreversible injuries.

Skin: Cement and/or cement pastes may have an irritating effect on moist skin (due to sweat or humidity) after prolonged contact or may cause dermatitis after repeated and prolonged contact. Furthermore, prolonged skin contact with wet cement and/or wet cement preparations (mortars, concrete, renders, etc.) may cause irritation, dermatitis or burns. *[for additional details see Reference (1)]*

***Inhalation*:** Repeated inhalation of cement dust over a long period of time increases the risk of developing lung diseases.

***Ingestion*:** Accidental ingestion of cement may cause ulcerations of the digestive system.

Environment: Under normal use, cement is not hazardous to the environment.

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

See the information provided under Subsection 4.1. When contacting a doctor, make sure you provide them with this Safety Data Sheet (SDS).

Section 5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media

Cement is not flammable. Therefore, in the event of a fire in the surrounding area, all types of fire extinguishing media can be used.

5.2 Special hazards arising from the mixture

Cement is non-combustible and non-explosive and will not facilitate or sustain the combustion of other materials.

5.3 Advice for fire-fighters

Cement poses no fire-related hazards. Therefore, there is no need for special protective equipment for the fire-fighters.

Section 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

6.1.1 For non-emergency personnel

Wear personal protective equipment (PPE) as described under Section 8 and follow the advice for safe use and handling given under Section 7.

6.1.2 For emergency responders

Special emergency procedures are not required. However, eyes, skin and respiratory protections are needed in situations with high dust levels.

6.2 Environmental precautions

Avoid discharging or dispersing cement into sewage and drainage systems or into watercourses.

6.3 Methods and materials for containment and cleaning up

Dry cement

Use dry clean up methods, such as vacuum clean-up or vacuum extractors [industrial portable units, equipped with high efficiency particulate filters or equivalent technology], which do not cause airborne dispersion. Never use compressed air.
Alternatively, wipe up the dust by dampening it and collect it with a broom or mop. Where this is not possible, remove by slurring with water (see: wet cement).
Make sure that the workers wear suitable personal protective equipment (see Section 8), in order to prevent inhalation of the cement dust and contact with skin and/or eyes.
Place the spilled material into containers. In case of large spills of cement, close or cover any water wells located nearby.

Wet cement

Clean up wet cement and place in containers. Allow the material to dry and harden before disposal as described under Section 13.

6.4 Reference to other sections

For additional details, see Sections 8 and 13.

Section 7. HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures

Follow the recommendations provided under Section 8.
To clean up dry cement, see Subsection 6.3.

Measures to prevent fire

No precautions are necessary since cement is neither combustible nor flammable.

Measures to prevent aerosol and dust generation

Do not sweep or use compressed air. Use dry clean up methods (such as vacuum clean-up and/or vacuum extractors) which do not cause airborne dispersion of the cement dust.

Also follow the recommendations provided under Subsection 15.1 "Good practice guide".

For additional information, refer to the guidelines adopted under the Agreement on Workers Health Protection through the Good Handling and Use of Crystalline Silica and Products containing it, by the European trade associations of workers and employers. Safe handling practices can be downloaded at the following link: http://www.nepsi.eu/agreement-good-practice-guide/good-practice-guide.aspx.

Measures to protect the environment

When handling cement, avoid releasing it into the environment (see also Subsection 6.2)

7.1.2 Information of a general nature on hygiene in the workplace

At the workplace, do not eat or drink in areas where cement is handled and/or stored. In dusty environments, wear dust masks and protective goggles. Use protective gloves to avoid contact with skin.

7.2 Conditions for safe storage, including any incompatibilities

Cement must be stored out of the reach of children, away from acids, in suitable closed containers (storage silos and bags), in a cool, dry, unventilated location, in order to preserve its technical characteristics and, in any case, preventing the dispersion of dust (see Section 10).

Engulfment hazard: cement can thicken or stick to the walls of the confined space in which it is stored; the mixture can release, collapse or fall unexpectedly.

In order to prevent engulfment or suffocation risks (during maintenance work or cleaning and/or unclogging operations), do not enter confined spaces - such as silos, hoppers, bulk trucks or other containers or vessels that store or contain the cement – without adopting specific safety procedures and suitable personal protective equipment.

Do not use aluminum containers for the storage or transport of mixtures containing moist cement due to incompatibility of the materials.

7.3 Specific end uses

No additional information (see also Subsection 1.2).

7.4 Effectiveness of the soluble chromium (VI) reducing agent

The integrity of the package and compliance with the proper storage procedures described above are essential conditions in order to ensure the effectiveness of the reducing agent for the period of time indicated in the delivery note or on each individual bag.

This expiry concerns exclusively the effectiveness of the reducing agent in keeping the content of soluble chromium (VI), determined according to standard EN 196-10, below the limit of 0.0002% of the total dry weight of the ready-to-use cement, required by current legislation (see Subsection 15.1), without prejudice to the limits of use of the product dictated by the general rules of storage and use of the product itself.

Section 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

The threshold limit value for the time-weighted average (TLV-TWA), adopted for workplaces by the American Conference of Governmental Industrial Hygienists (ACGIH), for Portland cement particulates is equal to 1 mg/m^3 (respirable fraction). *[for additional information, see also Subsection 15.1]*

To assess the **exposure level** (DNEL = Derived No-Effect Level):

- DNEL (respirable fraction): 1 mg/m^3
- DNEL (dermal): not applicable
- DNEL (oral): not relevant

Instead, the tool used for the risk assessment, MEASE, [*see Reference (17)*] works with the inhalable fraction. Therefore, a further precautionary condition may be implicitly correlated to the risk assessment procedure for occupational exposure.

For workers, no DNEL data for dermal exposure is available, neither from human hazard studies nor from human experience. Since cement dust is classified as irritating to skin and eyes, appropriate protective measures must be adopted to avoid contact.

To assess the **environmental risk** (PNEC = Predicted No Effect Concentration):

- PNEC for water: not applicable
- PNEC for sediment: not applicable
- PNEC for soil: not applicable

The risk assessment for ecosystems is based on the resulting pH impact on water. In any case, the pH of surface water, watercourses or in systems carrying water to purification plants should not be above 9.

With regard to the possible presence of crystalline free silica in the respirable fraction, for the professional user, comply with the occupational limits for occupational exposure to respirable crystalline silica during the 8 working hours (OEL (UE) = 0.1 mg/m^3 (respirable fraction, 8h) VLEP (IT) = 0.1 mg/m^3 (respirable fraction, 8h) - Annex XLIII of Legislative Decree. 81/2008)

The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a threshold value of 0.025 mg/m^3.

8.2 Exposure controls

For each Process Category (PROC), the user can choose between options (A) and (B) shown in Table 8.2.1 below, depending on the specific plant situation.

After choosing an option, it must also be selected in Table 8.2.2 of Subsection 8.2.2 "*Individual protection measures, such as personal protective equipment (PPE) – Specifications for respiratory protection equipment*"; therefore, the only possible combinations are between (A)-(A) and (B)-(B).

8.2.1 Suitable engineering controls

At facilities where cement is handled, transported, loaded, unloaded and stored, suitable hygienic and protective measures must be adopted in order to protect the workers and contain dust emission in the workplaces, as specified in the table below (evaluated for a DNEL value = 1 mg/m^3). Localized controls will be defined based on the existing plant-engineering situation, and consequently the specific corresponding equipment for respiratory protection will be identified, as indicated in the Table under Subsection 8.2.2.

Table 8.2.1

Exposure scenario	PROC (*)	Exposure	Localized controls	Efficiency
Industrial production / Formulation of hydraulic building and construction materials	2, 3	Duration is not restricted (up to 480 minutes per shift, 5 shifts a week)	Not required	-
	14, 26		A) not required, or B) generic local exhaust ventilation	- 78 %
	5, 8b, 9		generic local exhaust ventilation	78 %
Industrial uses of dry hydraulic building and construction materials (indoor and outdoor)	2		Not required	-
	14, 22, 26		A) not required, or B) generic local exhaust ventilation	- 78 %
	5, 8b, 9		generic local exhaust ventilation	78 %
Industrial uses of wet suspensions of hydraulic building and construction materials	7		A) not required, or B) generic local exhaust ventilation	- 78 %
	2, 5, 8b, 9, 10, 13, 14		Not required	-
Professional uses of hydraulic building and construction materials (indoor and outdoor)	2		A) not required, or B) generic local exhaust ventilation	- 72 %
	9, 26		A) not required, or B) generic local exhaust ventilation	-
	5, 8a, 8b, 14		generic local exhaust ventilation	72 %
	19 (#)	(#) < 240 min	Localized controls are not applicable. The processes may be carried out only in well-ventilated areas or outdoors	-
Professional uses of wet suspensions of hydraulic building and construction materials	11		A) not required, or B) generic local exhaust ventilation	- 72 %
	2, 5, 8a, 8b, 9, 10, 13, 14, 19		Not required	-

(*) PROCs are the identified uses, as defined under Subsection 1.2.

8.2.2 Individual protection measures, such as Personal Protective Equipment (PPE)

General:
At facilities where cement is handled, transported, loaded and unloaded and stored, suitable measures must be adopted for the protection of workers and for the containment of releases into the work environments. Do not eat, drink or smoke when working with the cement in order to avoid contact with skin or mouth. Immediately after handling or working with cement or cement-containing

products/preparations, workers should wash thoroughly with neutral soap or mild detergent or use moisturizing cream. Remove contaminated clothing, footwear, glasses, etc. and clean them thoroughly before using them again.

Eye/face protection

Wear approved glasses or safety masks certified according to UNI EN 166 when handling dry or wet cement to prevent contact with eyes.

Skin protection

Use gloves with mechanical abrasion resistance according to EN ISO 388 with nitrile or neoprene coating, preferably for ¾ or totally in case of more strenuous activities. In case of possible contact with the wet substance use gloves with specific chemical protection according to EN ISO 374 with specific thickness and degree of permeation (especially to alkalis) according to the type of use (immersion or possible accidental contact). Always replace damaged or drenched gloves immediately. In some cases, such as when laying concrete or screed, waterproof pants or knee pads are necessary.

Respiratory protection

When a worker may be potentially exposed to a concentration of respirable dust exceeding the exposure limits, use suitable respiratory protection, proportionate to the level of dustiness and conforming to the relevant EN standards (such as filtering facepieces certified according to UNI EN 149).

The personal protective equipment defined in relation to the localized controls and evaluated for a DNEL value = 1 mg/m^3, are specified in the following table.

Table 8.2.2

Exposure scenario	PROC (*)	Exposure	Specific respiratory protection equipment (RPE)	RPE efficiency – Assigned Protection Factor (APF)
Industrial production / Formulation of hydraulic building and construction materials	2, 3	Duration is not restricted (up to 480 minutes per shift, 5 shifts a week)	Not required	--
	14, 26		A) Mask P2 (FF) or B) Mask P1 (FF)	APF = 10 APF = 4
	5, 8b, 9		Mask P2 (FF)	APF = 10
Industrial uses of dry hydraulic building and construction materials (indoor and outdoor)	2		Not required	--
	14, 22, 26		A) Mask P2 (FF) or B) Mask P1 (FF)	APF = 10 APF = 4
	5, 8b, 9		Mask P2 (FF)	APF = 10
Industrial uses of wet suspensions of hydraulic building and construction materials	7		A) Mask P3 (FF) or B) Mask P2 (FF)	APF = 20 APF = 10
	2, 5, 8b, 9, 10, 13, 14		Not required	--
Professional use of hydraulic building and construction materials (indoor and outdoor)	2		A) Mask P2 (FF) or B) Mask P1 (FF)	APF = 10 APF = 4
	9, 26		A) Mask P3 (FF) or B) Mask P2 (FF)	APF = 20 APF = 10

	5, 8a, 8b, 14	(#) < 240 min	Mask P3 (FF)	APF = 20
	19 (#)		Mask P3 (FF)	APF = 20
Professional uses of wet suspensions of hydraulic building and construction materials	11		A) Mask P3 (FF) or B) Mask P2 (FF)	APF = 20 APF = 10
	2, 5, 8a, 8b, 9, 10, 13, 14, 19		Not required	--

(*) PROCs are the identified uses, as defined under Subsection 1.2.

An example of the assigned protection factors (APF) for different respiratory protective equipment (RPE), according to EN 529:2005, can be found in the glossary of MEASE approach *[see Reference (16)].*

Thermal hazards

Not applicable

8.2.3 Environmental exposure controls

See the engineering control measures to prevent dispersion of cement dust into the environment. Adopt measures to ensure that the cement does not reach water (sewers or ground or surface water).

At facilities where cement is handled, transported, loaded, unloaded and stored, suitable measures must be adopted to contain the dispersion of cement dust in the workplace (see also Subsections 8.2.1 and 15.1).

In particular, preventive measures must ensure the containment of the concentration of respirable particulate below the threshold limit value for the time-weighted average (TLV-TWA), adopted by the American Conference of Governmental Industrial Hygienists (ACGIH) for Portland cement.

Likewise, all the appropriate engineering-organizational steps must be taken in order to prevent the dispersion or accidental release of cement dust during the various stages of production and use, mainly to prevent dumping onto the soil or into water courses or sewers.

The environmental impact and the potential hazard to organisms/aquatic ecosystems are related to the increase in the pH due to the formation of hydroxides; on the other hand, ecotoxicity resulting from other inorganic components (ions) is negligible compared to the negative effect on the pH.

In any case, any negative effects that might occur during production and use of the cement would be expected to take place on a local scale at the industrial installation. The pH of the effluent and surface water should not exceed 9.

Otherwise, it could have an impact on municipal sewage treatment plants (STPs) and industrial wastewater treatment plants (WWTPs).

For assessment of the exposure, a systematic approach is recommended:

- Tier 1: collect information on effluent pH and the contribution of the cement dust to any change; if the pH is above 9 due to the predominant contribution of the cement dust, suitable preventive measures need to be adopted.
- Tier 2: collect information on receiving water pH after the discharge point; the pH must not exceed the value of 9.
- Tier 3: sample and measure the pH in the receiving water, after the discharge point. If the pH is below 9, it is reasonable to assume the absence of any negative effect, while if the pH is found to be above 9, neutralizing actions must be taken at the discharge, in order to avoid any environmental impact due to the dispersion of cement dust, during the various stages of production and use.

On the other hand, no specific preventive measures are required for the impact on the soil, except for the proper application of ordinary, effective managerial practices.

For additional details, see Section 6.

Section 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance: the cement is a solid inorganic material in powder form
b) Color: gray or white powder (dry cement)
c) Odor: odorless
d) Melting point/freezing point: > 1250 ° C/not relevant
Boiling point or initial boiling point and boiling range: Not applicable since, under normal atmospheric conditions, the melting point is > 1250 ° C
f) Flammability (solid, gas): Not applicable since it is a non-combustible solid and does not cause or contribute to fire through friction
g) Upper/lower explosive limits: Not applicable since it is not a flammable gas
h) Flash point: not applicable since it is not a liquid
i) Auto-ignition temperature: Not applicable (no pyrophoricity – no organo-metallic, organo-metalloid or organo-phosphine bindings or their derivatives, and no other pyrophoric constituent in the composition)
j) Decomposition temperature: Not applicable since there is no organic peroxide present
k) pH: (T = 20 ° C in water, water-solid ratio 1:2): 11-13.5
l) Kinematic viscosity: Not applicable since it is not a liquid
m) Solubility in water (T = 20 ° C): light (0.1-1.5 g/l)
n) Partition coefficient: n-octanol/water: Not applicable since it is an inorganic mixture
o) Vapor pressure: Not applicable since the melting point is > 1250 ° C
p) Density and/or relative density: 2.75-3.20; apparent density: 0.9-1.5 g/cm^3
q) Relative vapor density: Not applicable since the melting point is > 1250 ° C
r) Characteristics of the particles: main particle size: 5-30 µm

9.2 Other information

Not applicable

9.2.1 Information on physical hazard classification

Not applicable

9.2.2 Other safety characteristics

Not applicable

Section 10. STABILITY AND REACTIVITY

10.1 Reactivity

When mixed with water, cement hardens and forms a stable mass that is not reactive in the environment.

10.2 Chemical stability

The cement as such is stable as long as it is properly stored (see Section 7); it must be kept dry, avoiding contact with incompatible materials.

Wet cement is alkaline and incompatible with acids, ammonium salts, aluminum and other non-noble metals. It decomposes in hydrofluoric acid to produce silicon tetrafluoride, a corrosive gas. The silicates in the cement react with powerful oxidants such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride and oxygen difluoride

Integrity of the package and compliance with the storage conditions described under Subsection 7.2, are essential conditions in order to maintain the effectiveness of the reducing agent for the period of time specified on the bag or in the delivery note.

10.3 Possibility of hazardous reactions

Cement does not cause hazardous reactions.

10.4 Conditions to be avoided

The presence of humidity during storage may result in the loss of product quality and the formation of lumps (or blocks), thus making it difficult to handle.

10.5 Incompatible materials

Contact with acids, ammonium salts, aluminum or other non-noble metals can cause exothermic reactions (temperature rise). Furthermore, the contact of aluminum dust with wet cement causes the formation of hydrogen.

10.6 Hazardous decomposition products

Cement does not decompose into any hazardous products.

Section 11. TOXICOLOGICAL INFORMATION

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

Hazard class	Cat.	Effect	References
Acute toxicity - dermal	-	Limit test in vivo and in vitro on animals (rabbit, contact 24 hours, 2 g/kg body weight) - not lethal. Based on the available data, the classification criteria are not met.	(2)
Acute toxicity - inhalation	-	No acute toxicity by inhalation observed. Based on the available data, the classification criteria are not met.	(9)
Acute toxicity - oral	-	No indication of oral toxicity from studies with cement kiln dust. Based on the available data, the classification criteria are not met.	Literature survey
Corrosion / skin irritation	2	Cement in contact with wet skin may cause thickening, cracking or fissuring of the skin. Prolonged contact in combination with existing abrasions may cause severe burns. Some individuals may develop eczema following exposure to wet cement dust, caused by the high pH which induces irritant contact dermatitis after prolonged contact.	(2) human experience
Serious eye damage / eye irritation	1	Clinker caused heterogeneous effects on the cornea and the calculated irritation index was 128. Cements contain varying quantities of clinker and secondary components, such as gypsum, blast furnace slag, fly ash, limestone and natural pozzolana. Direct contact with cement may cause corneal damage by mechanical stress, immediate or delayed irritation or inflammation. Direct contact with large amounts of dry cement or splashes of wet cement may cause effects ranging from moderate eye irritation (e.g., conjunctivitis or blepharitis) to chemical burns and blindness.	(10), (11)
Skin sensitization	1B	Some individuals may develop eczema as a result of exposure to wet cement dust, caused either by the high pH, which induces irritant dermatitis after prolonged contact, or by an immunological reaction to soluble Cr (VI) which elicits allergic contact dermatitis. The response may appear in a variety of forms, from a mild skin rash to severe dermatitis. No sensitizing effect is expected if the cement contains a soluble CR (VI) reducing agent, as long as A the specified period of effectiveness of the reducing agent is not exceeded [see Reference (3)].	(3), (4), (17)

Respiratory sensitization	-	There is no indication of sensitization of the respiratory system. Based on the available data, the classification criteria are not met.	(1)
Mutagenicity of embryonic cells (germ)	-	No indication. Based on the available data, the classification criteria are not met.	(12), (13)
Carcinogenicity	-	No causal association has been established between exposure to Portland cement and cancer. Epidemiological literature does not support the designation of Portland cement as a suspected human carcinogen. Portland cement is not classifiable as a human carcinogen (according to ACGIH A4: agents that cause concern that they could be carcinogenic to humans, but which cannot be assessed conclusively due to a lack of data. In vitro or animals studies do not provide indications of carcinogenicity which are sufficient to classify the agent under one of the other notations). Based on the available data, the classification criteria are not met.	(1) (14)
Reproductive toxicity	-	Based on the available data, the classification criteria are not met.	No evidence from human experience
STOT – single exposure	3	Cement dust may irritate the throat and respiratory tract; coughing, sneezing and shortness of breath may occur following exposures in excess of the occupational exposure limits. Overall, the evidence gathered clearly indicates that occupational exposure to cement dust has produced deficits in respiratory function. However, evidence available at the present time is insufficient to establish with any confidence the dose-response relationship for these effects.	(1)
STOT – repeated exposure	-	Long-term exposure to respirable cement dust above the occupational exposure limit can lead to coughing, shortness of breath and chronic obstructive alterations in the respiratory tract. There were no chronic effects at low concentrations. Based on the available data, the classification criteria are not met.	(15)
Risk of aspiration	-	Not applicable, since cement is not used as an aerosol.	

Apart from skin sensitization, Portland cement clinker and common cements have the same toxicological and eco-toxicological properties.

Medical conditions aggravated by exposure

Prolonged inhalation of respirable cement dust may aggravate existing respiratory illnesses and/or medical conditions such as emphysema or asthma and/or existing skin and/or eye conditions.

11.2 Information on other hazards

None

11.2.1 Endocrine disrupting properties

Not applicable

11.2.2 Other information

Not applicable

Section 12. ECOLOGICAL INFORMATION

12.1 Toxicity

Cement is not hazardous to the environment.

Eco-toxicological tests with Portland cement on Daphnia magna [Reference (5)] and Selenastrum coli [Reference (6)] have shown little toxicological impact. Therefore, LC50 and EC50 values could not be determined [Reference (7)].
There is no indication of sediment phase toxicity [Reference (8)].

In the case of large amounts of cement dispersed in water, under certain circumstances there may be ecotoxicity effects for aquatic life due to the consequent increase in pH.

12.2 Persistence and degradability

Not relevant since cement is an inorganic material. After hardening, cement presents no toxicity risks.

12.3 Bioaccumulation potential

Not relevant since cement is an inorganic material. After hardening, cement presents no toxicity risks.

12.4 Mobility in soil

Not relevant since cement is an inorganic material. After hardening, cement presents no toxicity risks.

12.5 Results of PBT and vPvB assessment

Not relevant since cement is an inorganic material. After hardening, cement presents no toxicity risks.

12.6 Endocrine system disrupting properties

Not relevant.

12.7 Other adverse effects

Not relevant.

Section 13. DISPOSAL CONSIDERATIONS

Cement and any packaging that need to be disposed of must be managed according to the provisions of Part IV "Waste management regulations" of Legislative Decree 152/2006 "Environmental Regulations" as amended, and subsequent implementing decrees.

13.1 Waste treatment methods

Do not dispose in sewers or surface water.

Product - Cement beyond its expiry date

When it is shown to contain more than 0.0002% of soluble chromium VI: it must not be used/sold except for use in closed, controlled and fully automated processes or it must be recycled or managed in accordance with Legislative Decree 152/2006 as amended or treated again with a reducing agent.

Product – unused residue or dry spillage

Collect unused dry residue or dry spills as they are. If necessary, reuse according to shelf-life considerations and the requirement to avoid exposure to dust. In case of disposal, manage in compliance with Legislative Decree 152/2006, as amended.

Product – sludge

Allow to harden, avoid entry into sewer and drainage systems or bodies of water (e.g., streams), and dispose of as explained below in "Product - after the addition of water, hardened".

Product – after the addition of water, hardened

Dispose of according to Legislative Decree 152/2006, as amended. Avoid entry into the sewer system.

Packaging

Empty the packaging and manage it in compliance with current regulations. Assignment of the EER code must be carried out in accordance with the Guidelines adopted pursuant to art. 184, comma 4 of Legislative Decree 152/2006, as amended,

Section 14. TRANSPORT INFORMATION

Cement is not covered by international regulations for the transport of dangerous goods: IMDG (sea), ADR (road), RID (rail), IATA (air), and therefore no classification is required. No special precautions are necessary except for those mentioned under Section 8. During transport, prevent dispersal caused by the wind by using closed containers.

14.1 UN number or ID number

Not relevant.

14.2 UN proper shipping name

Not relevant.

14.3 Transport hazard classes

Not relevant.

14.4 Packing group

Not relevant.

14.5 Environmental hazards

Not relevant.

14.6 Special precautions for users

Not relevant.

14.7 Bulk transport by sea according to IMO instruments

Not relevant.

Section 15. REGULATORY INFORMATION

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

- (EC) Regulation 1907/2006 concerning the registration, evaluation, authorization and restriction of chemicals (REACH) as amended
- (EC) Regulation 1272/2008 on the classification, labeling and packaging of substances and mixtures, with modification and repeal of Directives 67/548/EEC and 1999/45/EC and of Regulation 1907/2006/EC (CLP) as amended.
- Legislative Decree 81 dated 9 April 2008 as amended "Implementation of article 1 of Law no. 123 of 3 August 2007 regarding the protection of health and safety in the workplace".
- Decree of the Ministry of Health 10/05/2004 "Implementation of Directive 2003/53/EC on the twenty-sixth amendment to Directive 76/769/EEC of 27/07/1976, regarding the restrictions on the marketing and use of certain dangerous substances and preparations (nonylphenol, nonylphenol ethoxylate, **cement**)"
- Decree of the Ministry of Health 17/02/2005 "Adoption of a test method relating to cements, in reference to Ministerial Decree 10/05/2004, which implemented the twenty-sixth amendment of Directive 76/769/EEC"
- EN 196/10 - "Test methods for concrete – Part 10: Determination of the content of soluble chromium VI in cement"

- EN 197/1 – "Cement - Composition, specifications and conformity criteria for common cements"
- EN 15368 Hydraulic binder for non-structural applications - Definition, specifications and conformity criteria
- EN 413-1 Masonry cement - Part 1: Composition, specifications and conformity criteria
- EN 14216 Cement - Composition, specifications and conformity criteria for special cements at heat for hydration
- Legislative Decree 152/2006 "Environmental regulations" as amended
- Directive 2004/37/EC as amended on the protection of workers from the risks related to exposure to carcinogens and mutagens at work
- Regulation 2020/1677/EU amending Regulation (EC) no. 1272/2008 of the European Parliament and of the Council on the classification, labeling and packaging of substances and mixtures in order to improve the workability of information requirements related to emergency health response
- Legislative Decree no. 44 of 1 June 2020 "Implementation of (EU) Directive 2017/2398 of the European Parliament and of the Council of 12 December 2017, which amends Directive 2004/37/EC of the Council on the protection of workers from risks related to exposure to carcinogens or mutagens at work.
- Decree no. 47 of 9 August 2021 approving "Guidelines on waste classification" referred to the resolution of the Council of the National System for Environmental Protection no. 105 of 18 May 2021, as envisaged by art. 184, comma 5 of Legislative Decree no. 152 of 2006, as amended by Legislative Decree no. 116 of 2020.

The so-called "**Good practice guide**", which provides practical information on proper handling and use of **respirable crystalline silica** and products containing it, is available on the website http://www.nepsi.eu/good-practice-guide.aspx.

These engineering and operational methods were implemented within the framework of the Social Dialogue *"Agreement on Workers Health Protection through the Good Handling and Use of Crystalline Silica and Products containing it"*, signed on 25 April 2006 between employers and workers' representatives from various industrial sectors at the European level, including Cement Companies.

In this context, depending on the specific formulation of the mixture (cf. silica components and the possible content of respirable crystalline silica) and on the methods of use, it is appropriate to implement appropriate technical-organizational measures and systematic monitoring of occupational exposure, keeping in mind that the limit value (TLV-TWA), adopted for work environments by the American Industrial Hygienists Association (ACGIH) for "respirable crystalline silica" is 0.025 mg/m3, referring to the respirable fraction, while for Legislative Decree no. 44 of 1 June 2020 transposition of Directive (EU) 2017/2398, the limit is 0.1 mg/m^3 in work involving exposure to respirable crystalline silica dust generated by a work process.

- Restrictions on the marketing and use of cement concerning the content of chromium VI

Regulation 1907/2006/EC concerning the registration, evaluation, authorization and restriction of chemicals ("REACH"), **under Section 47 of Annex XVII**, as amended by **Regulation 552/2009/EC**, prohibits the marketing and use of cement and cement preparations (mixtures= if they contain, when mixed with water, more than 0.0002% (2 ppm) of soluble chromium VI of the total dry weight of the cement itself.

Compliance with this limit threshold is ensured, if necessary, by adding a reducing agent to the cement, the effectiveness of which is guaranteed for a predefined time period and with the constant observance of suitable methods (described under Subsections 7.2 and 10.2).

Pursuant to this Regulation, use of the reducing agent requires communication of the following information:

DATE OF PACKAGING	indicated on the bag or in the delivery note
STORAGE CONDITIONS	in special closed containers, in a cool and dry place with no ventilation, with a guarantee of maintaining the intactness of the package
STORAGE PERIOD *(*)*	as indicated on the delivery note (for bagged or bulk product) and on each individual bag

*(*) To maintain the effectiveness of the r*qualitaitve *educing agent.*

The expiry only applies to the effectiveness of the reducing agent in relation to Chromium VI salts, without prejudice to the limits of use indicated in the general rules of storage and use of the product itself

Requirements of Regulation 1907/2006/EC "REACH"

Cement, according to "REACH" Regulations, is a mixture and, as such, is not subject to the obligation for registration, which instead concerns substances.

Portland cement clinker is a substance (*classifiable as a UVCB inorganic substance*) exempt from registration according to art. 2.7 (b) and Annex V.10 of REACH, under which the European Agency ECHA has also been notified with the necessary information to make an inventory for classification and labeling (C&L) pursuant to art. 40 of EC Regulation 1272/2008 "CLP" *(see Notification no. 02-2119682167-31-0000 dated 15 December 2010; updated on 1 July 2013 with presentation of Report QJ420702-40.*

With regard to *Flue dust (CKD and BPD)*, **the Annex** outlines the use descriptors of the substance (ref. Chemical Safety Report), related to the identified uses and, in particular, the exposure scenario usually used in the manufacturing cycle of hydraulic binders (ref. e-SDS).

Exposure scenario	Sector of use SU	Product Category PC	Process category PROC	Environmental Release Category ERC
Industrial manufacture of hydraulic building and construction materials	not applicable	0, 9a, 9b	2, 3, 5, 8b, 9, 14, 26	2

Moreover, if some substances used in the manufacturing of cement should become subject to registration, this Safety Data Sheet will be suitably updated based on the information provided by the Registrant and, in particular, if it is found that the data on descriptions of use, exposure scenarios, classification, etc. may entail repercussions on the previously effective risk assessment.

15.2 Chemical safety assessment

No chemical safety assessment needs to be carried out. Enclosed please find the exposure scenario for the flue dust (CKD) and By-pass (BPD) as they are a hazardous substance contained in the cement mixture and in hydraulic binders in the concentrations specified under Section 3.

Section 16. OTHER INFORMATION

16.1 Indications of changes

This Safety Data Sheet was revised in application of (EU) Regulation 2020/878 which amends Annex II of (EC) Regulation 1907/2006 of the European Parliament and of the Council concerning the registration, evaluation, authorization and restriction of chemicals (REACH) and to take into account the update of the reference standards concerning Personal Protective Equipment.

16.2 Abbreviations and acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
ADR /RID	European Agreements on the transport of Dangerous goods by Road/Railway
APF	Assigned protection factor
CAS	Chemical Abstracts Service
EC	European Community
CLP	Classification, labeling and packaging (EC Regulation 1272/2008)
DNEL	Derived no-effect level
EC50	Half maximal effective concentration
ECHA	European Chemicals Agency
EINECS	European INventory of Existing Commercial chemical Substances
ERC	Environmental release category
ES	Exposure Scenario
FFP	Filtering Face piece against Particles
FMP	Filtering Mask against Particles with filter cartridge

IATA	International Air Transport Association
IMDG	International agreement on the Maritime transport of Dangerous Goods
IMO	International Maritime Organization
IMSBC	International Maritime Solid Bulk Cargoes
LC50	Median lethal dose
LD50	Lethal Dose
MEASE	Metal Estimation and Assessment of Substance Exposure
MS	Member State
NOEL	No Observed Effect Level
OELV	Occupational Exposure Limit Value
PBT	Persistent, bio-accumulative and toxic
PC	Product category
PNEC	Predicted no-effect concentration
PPE	Personal protective equipment
PROC	Process category
REACH	Registration, Evaluation and Authorization of Chemicals (EC Regulation. 1907/2006)
RPE	Respiratory protective equipment
SCOEL	Scientific Committee on Occupational Exposure Limit Values
SDS	Safety Data Sheet
e-SDS	Extended Safety Data Sheet (Safety Data Sheet with exposure scenario)
SE	Single exposure
STP	Sewage treatment plant
STOT	Specific Target Organ Toxicity
SU	Sector of use
TLV-TWA	Threshold Limit Value - Time-Weighted Average
UFI	Unique Formula Identifier
UVCB	Substance of Unknown or Variable composition, Complex reaction products or Biological materials
VLE	Exposure Limit Value
vPvB	Very persistent, very Bio-accumulative
w/w	Weight by weight
WWTP	Wastewater treatment plant

16.3 References and sources of main information

(1) *Portland Cement Dust - Hazard assessment document EH75/7,* UK Health and Safety Executive, 2006. Available from: http://www.hse.gov.uk/pubns/web/portlandcement.pdf

(2) *Observations on the effects of skin irritation caused by cement*, Kietzman et al, Dermatosen, 47, 5, 184-189 (1999).

(3) *European Commission's Scientific Committee on Toxicology, Ecotoxicology and the Environment (SCTEE) opinion of the risks to health from Cr (VI) in cement* (European Commission, 2002). http://ec.europa.eu/health/archive/ph_risk/committees/sct/documents/out158_en.pdf

(4) *Epidemiological assessment of the occurrence of allergic dermatitis in workers in the construction industry related to the content of Cr (VI) in cement*, NIOH (page 11, 2003)

(5) U.S. EPA, *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, 4th ed. EPA-821-R-02-013, US EPA, office of water, Washington D.C. (October 2002).

(6) U.S. EPA, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 5th ed. EPA-821-R-02-012, US EPA, office of water,

Washington D.C. (October 2002).

(7) *Environmental Impact of Construction and Repair Materials on Surface and Ground Waters. Summary of Methodology*, Laboratory Results, and Model Development. NCHRP report 448, National Academy Press, Washington, D.C. (2001).

(8) *Final report Sediment Phase Toxicity Test Results with Corophium volutator for Portland clinker* prepared for Norcem A.S. by AnalyCen Ecotox. AS (2007).

(9) TNO report V8801/02, *An acute (4-hour) inhalation toxicity study with Portland Cement Clinker CLP/GHS 03-2010-fine in rats* (August 2010).

(10) TNO report V8815/09, *Evaluation of eye irritation potential of cement clinker G in vitro using the isolated chicken eye test* (April 2010).

(11) TNO report V8815/10, *Evaluation of eye irritation potential of cement clinker W in vitro using the isolated chicken eye test* (April 2010).

(12) *Investigation of the cytotoxic and proinflammatory effects of cement dusts in rat alveolar macrophages*, Van Berlo et al, Chem. Res. Toxicol. (September 2009); 22(9):1548-58.

(13) *Cytotoxicity and genotoxicity of cement dusts in A549 human epithelial lung cells in vitro*; Gminski et al, Abstract DGPT - Conference Mainz (2008).

(14) *Comments on a recommendation from the American Conference of governmental industrial Hygienists to change the threshold limit value for Portland cement*, Patrick A. Hessel and John F. Gamble, EpiLung Consulting (June 2008).

(15) Exposure to Thoracic Aerosol in a Prospective Lung Function Study of Cement Production Workers; Noto, H., et al; Ann. Occup. Hyg., 2015, Vol. 59, No. 1, 4–24.

(16) MEASE, Metals estimation and assessment of substance exposure, EBRC Consulting GmbH for Eurometaux, http://www.ebrc.de/industrial-chemicals-reach/projects-and-references/mease.php

(17) Occurrence of allergic contact dermatitis caused by chromium in cement. A review of epidemiological investigations, Kåre Lenvik, Helge Kjuus, NIOH, Oslo (December 2011).

16.4 Classification and procedure used to obtain the classification of mixtures pursuant to (EC) Regulation 1272/2008 [CLP]

The **main types of cement and trade names** of hydraulic binders are:

Product family	Products
Calinto	Calinto
ECOSPRITZ Binders	ECOSPRITZ WLT (W007- W003)
ECOSPRITZ Binders	ECOSPRITZ (N005)
BASE PRONTAPRESA	BASE PRONTAPRESA
standard formula 1	CEM I
standard formula 1	API Class G HSR
standard formula 1	Oil Well Cement
standard formula 2	CEM III/A
standard formula 2	CEM III/B
standard formula 4	CEM IV/A (P)
standard formula 4	CEM II/B-P
standard formula 5	CEM IV/A-V
standard formula 7	CEM II/A-LL

standard formula 7	CEM II/B-LL
standard formula 15	IV/A (P-V)
standard formula 15	IV/B (P-V)

The table below lists the classification and procedures used to obtain the classification of the mixture pursuant to EC Regulation 1272/2008 "CLP":

Classification pursuant to (EC) Regulation 1272/2008		Classification procedure
Skin irritation 2	H315	On the basis of test data
Skin sensitization 1B	H317	Actual experience
Eye injuries 1	H318	On the basis of test data
STOT SE 3	H335	Actual experience

The data and test methods used for the purpose of classification of common cements are provided under Subsection 11.1.

16.5 Hazard Statements and Safety advice in force (Respiratory or skin sensitization Serious eye injury/serious eye irritation STOT-single exposure)

See Section 2.

16.6 Training advice

In addition to health, safety and environmental training programs for its own workers, the User company must ensure that workers read, understand and apply the requirements of this Safety Data Sheet.

16.7 Additional information – Methods

See exposure scenario no. 9.1.

16.8 Disclaimer

The information contained in this Safety Data Sheet, updated in accordance with current legal provisions, reflects the currently available and is reliable provided that the product is used under the prescribed conditions and in accordance with the application specified on the package and/or in the technical guidance literature.

Any other use of the product, including in combination with any other product or any other process, is the responsibility of the User.

It is implicit that the User is also responsible for determining appropriate safety measures and for applying suitable operating procedures regarding the prevention of risks in their own activities, in compliance with current legislation.

Emergency contacts – Italian Poison Control Centers

	CAV - Hospital	City	Address - Zip Code	Telephone no. *
1	Hospital - Universitaria "Ospedali Riuniti"	Foggia	Viale Luigi Pinto 1 - 71122	800183459
2	Hospital "A. Cardarelli"	Naples	Via A. Cardarelli 9 - 80131	081-5453333
3	University Hospital "Umberto I"	Rome	Viale del Policlinico 155 - 00161	06 49978000

4	University Hospital "A. Gemelli"	Rome	Largo Agostino Gemelli 8 - 00168	06 3054343
5	Hospital - Universitaria "Careggi" - Medical Toxicology	Florence	Largo Brambilla 3 - 50134	055 7947819
6	Centro Nazionale di Informazione Tossicologica (National Center for Toxicological Information) IRCCS Fondazione S. Maugeri, Clinica del Lavoro	Pavia	Via Salvatore Maugeri 10 - 27100	0382 24444
7	Hospital "Niguarda Ca' Granda"	Milan	P.za Ospedale Maggiore 3 - 20162	02 66101029
8	Hospital "Papa Giovanni XXII" – Clinical Toxicology	Bergamo	Piazza OMS 1 - 24127	800 883300
9	Pediatric Hospital "Bambino Gesù" DEA Acceptance and Emergency Ward	Rome	Piazza Sant'Onofrio 4 - 00165	06 68593726
10	Verona Integrated Hospital	Verona	Piazzale Aristide Stefani, 1 - 37126	800011858

* from abroad: +39 xxx xxxxxx

This Safety Data Sheet, as well as any subsequent revisions, is available in digital form on the company website: www.buzziunicem.it/prodotti/schede-sicurezza

2020/12/EAS

CEMENT KILN DUST (CKD) AND BY-PASS DUST (BPD) EXPOSURE SCENARIO

Exposure Scenario no. 9.1.
Industrial manufacture of hydraulic building and construction materials

Exposure Scenario addressing uses carried out by workers	
1. Title: Industrial manufacture of hydraulic building and construction materials	
Title	Manufacture of mixtures containing Flue Dust: cement, hydraulic binder, controlled low strength material, concrete (ready-mixed or precast) mortar, grout and other products for building and construction work.
Sector of use	Not applicable
Market sectors	PC 0: Building and construction products PC 9b: Fillers, putties, plasters, modeling clay PC 9a: Coatings and paints, thinners, paint removers
Environmental scenario	ERC 2: Formulation of preparations
Work scenarios	PROC 2: Use in closed and continuous process, with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 5: Mixing or blending in batch process for the formulation of preparations and articles (contact in different phases and/or significant contact) PROC 8b: Transfer of substance or preparation (filling/emptying) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of a substance or preparation into small containers (dedicated filling line, including weighing) PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletizing PROC 26: Handling of solid inorganic substances at room temperature
Assessment method	The assessment of inhalation exposure is based on the dustiness/fugacity of the sustance, using the exposure estimation tool MEASE. The environmental assessment is based on a qualitative approach, described in the introduction. The relevant parameter is the pH in water and soil.

2. Operational conditions and risk management measures

2.1 Control of workers' exposure

Product characteristics

Hydraulic building and construction materials are inorganic binders. Generall, these products are mixtures of Portland cement clinker and other hydraulic and non-hydraulic constituents.

Flue Dust can be part of common cements, like Portland cement. In this main application, **the Flue Dust content is less than 5%**.

In other hydraulic binders, the Flue Dust content could be more than 50%. Generally, the content in a hydraulic mixture is not restricted. Flue Dust is a very dusty substance.

In all end uses, the substance will intentionally come into contact with water. In part, the substance reacts with water and forms hydration products. At this stage of a wet or pasty suspension, the product is irritating due to the pH, which is above 11 Instead, the final product hardens (e.g., as mortar, concrete) and is not irritating, since no free alkaline moisture remains.

Amounts used

The quantity/year handled during each single work shift is not considered to influence the exposure scenario of the workers. Instead, the combination of the scale of operation (industrial vs. professional) and level of containment and/or automation of the systems (as reflected in the PROC) is the main determinant of the intrinsic dust emission potential of the process.

Frequency and duration of use/exposure

Processes	Duration of the exposure
PROC 2, 3, 5, 8b, 9, 14, 26 (all)	no restriction (480 minutes)

Human factors not influenced by risk management

The breathable volume per shift, during all process phases indicaed in the PROCs is assumed to be equal to 10 m³/shift (8 hours).

Other given operational conditions affecting workers' exposure

Operational conditions, such as process temperature and process pressure, are not considered relevant for occupational exposure assessment of the workers during the production activity.

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

Risk management measures at the process level are generally not required during the work activity.

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

Processes	Localized controls (LC)	Efficiency of LC (according to MEASE)	Other information
PROC 2, 3	General ventilation	17 %	-
PROC 5, 8b, 9, 14, 26	General local ventilation	78 %	-

Organizational measures to prevent/limit releases, dispersion and exposure

Avoid inhalation or ingestion. General workplace 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 equipment), no eating or smoking at the workplace, wearing standard worki clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home and, lastly, do not use compressed air to remove dust.

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

Processes	Specific respiratory protection equipment (RPE)	**RPE efficiency – Assigned Protection Factor (APF)**	Indication of gloves	Additional personal protective equipment (PPE)
PROC 2, 3	Not required	Not applicable	Waterproof, abrasion and alkali resistant gloves, internally lined with cotton. The use of gloves is mandatory since Flue Dust is classified as irritating to skin.	Safety goggles or visors (in accordance with EN 166) are mandatory, since Flue Dust is classified as highly irritating to eyes. Additional face protection, protective clothing and safety shoes are required to be worn as appropriate.
PROC 5, 8b, 9	Mask FF P2	APF = 10		
PROC 14, 26	Mask FF P1	APF = 4		

Gloves and eye protective equipment must be worn unless potential contact with the skin and eyes can be excluded by the nature and type of application (i.e., closed process).

An example of the assigned protection factors (APF) for different respiratory protective equipment (RPE), according to EN 529:2005, can be found in the glossary of MEASE approach.

All RPE as defined above must only be worn if the following preventive measures are implemented in parallel: The duration of the work activity (compared to the "duration of exposure" referred to above) should take into account the additional physiological stress for the worker due to the breathing resistance and weight of the RPE itself, due to the increased thermal stress (referred to the the head).

In addition, it should be taken into account that the worker's capability of using tools and communicating is reduced while wearing RPE.

For the reasons given above, the worker should therefore be: (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have facial characteristics suited to reducing leakages between face and mask (in view of scars and hair).

The equipment recommended above, which rely on a tight face seal will not provide the required protection unless they fit the contours of the face in a proper and secure manner.

Employers and self-employed individuals are responsible for both the issue of personal protective equipment and the management of their proper use at the workplace, and for periodical checks and maintenance. Therefore, they should also define and document suitable training and educational initiatives aimed at workers on the proper use of individual protective equipment.

2.2 Control of environmental exposure

Product characteristics

Hydraulic building and construction materials are inorganic binders. Generally, these products are mixtures of Portland

cement clinker and other hydraulic and non-hydraulic constituents.

Flue Dust can be part of common cements, like Portland cement. In this main application, **the Flue Dust content is less than 5%**.

In other hydraulic binders, the Flue Dust content could be more than 50%. Generally, the content in a hydraulic mixture is not restricted. Flue Dust is a very dusty substance.

In all end uses, the substance will intentionally come into contact with water. In part, the substance reacts with water and forms hydration products. At this stage of a wet or pasty suspension, the product is irritating due to the pH, which is above 11 Instead, the final product hardens (e.g., as mortar, concrete) and is not irritating, since no free alkaline moisture remains.

Amounts used

The daily and annual quantity per production site (refer to the actual emission source in an industrial setting) is not considered a determining factor for affecting the environmental exposure scenario.

Frequency and duration of use

Intermittent (used < 12 times/year for not more than 24 consecutive hours) or continuous use/release.

Environmental factors not influenced by risk management

Flow rate of receiving surface water: 18,000 m³/d

Other given operational conditions affecting environmental exposure

Effluent discharge rate: 2,000 m³/d

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

Risk managementmeasures related to the environment aim to avoid discharging suspensions containing Flue Dust into municipal waste water or to surface water. In this case, such discharges are expected to cause significant changes in the pH Therefore, regular control of the pH value during introduction into surface waters is required. Usually, discharges should be carried out so that pH changes in receiving surface waters are minimized (e.g., through neutralization). In general, most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standardized OECD tests with aquatic organisms.

Organizational measures to prevent/limit release from site

Training for the workers, based on the Safety Data Sheet (SDS).

Conditions and measures related to municipal sewage treatment plants

The pH of the wastewater going into the municipal sewage treatment plant must be controlled on a regular basis and neutralized if necessary.

Solid Flue Dust constituents must be separated from the sewage effluent,

Conditions and measures related to waste disposal

Solid industrial waste containing Flue Dust should be reused or disposed of after hardening and/or neutralization.

3. Exposure estimation

3.1 Occupational exposure (health)

The exposure estimation tool MEASE was used to assess the inhalation exposure.

The risk characterization ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level). This value has to be below 1 to demonstrate safe use.

For inhalation exposure, the RCR is based on DNEL = 1 mg/m³ (as respirable dust), and the respective inhalation exposure estimate obtained using MEASE (as inhalable dust).

In this way, the RCR value includes an additional safety margin since the respirable fraction is a sub-fraction of the inhalable fraction in accordance with UNI EN 481.

Processes	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 2, 3, 5, 8b, 9, 14, 26	MEASE	< 1 mg/m³ (0.44 - 0.83)	Since Flue Dust is classified as irritating to skin and eyes, dermal exposure has to be minimized as far as technically feasible. A DNEL for dermal effects has not been determined. Therefore, dermal exposure is not assessed in this exposure scenario.	

3.2 Environmental emissions

Significant emissions or exposure to air are not expected due to the low vapor pressure of Flue Dust. On the other hand, specific preventive measures are not necessary for terrestrial impact, apart from the proper implementation of ordinary and effective managerial practices, Therefore, these emissions are not deemed relevant for this exposure scenario.

The environmental exposure assessment is only relevant for the aquatic environment as emissions of Flue Dust in the different life-cycle stages (production and use) mainly apply to ground and waste water.

The environmental impact and the potential hazard to organisms/aquatic ecosystems are related to the increase in the pH due to the formation of hydroxides; on the other hand, ecotoxicity resulting from other inorganic components (ions) is negligible compared to the negative effect on the pH.

In any case, any negative effect correlated to the manufacturing cycle and use of Flue Dust has a localized impact at the industrial plant. Indeed, the pH level may have a negative impact on the municipal sewage treatment plants (STPs) or industrial wastewater treatment plants (WWTPs). For this assessment, a systematic approach is adopted, bearing in mind that the pH of surface water should not exceed 9.

Environmental emissions	The production of Flue Dust can potentially result in an aquatic emission, whereby locally the pH and the amount of the following ions can be increased in the aquatic environment: K^+, Na^+, Ca^{2+}, Mg^{2+}, SO_4^{2-}, Cl^-. When the pH is not neutralized, the effluent of the production sites may impact the pH of the receiving water. Generally, the pH of the effluents is measured frequently and can be neutralized easily as often as required by national legislation.
Exposure concentration in wastewater treatment plant (WWTP)	Waste water from Flue Dust production is an inorganic waste water stream, for which no biological treatment is necessary. Waste water streams from Flue Dust production sites will normally not be treated in biological waste water treatment plants (WWTPs) but can be used for pH control of acid waste water streams that are treated in biological WWTPs.
Exposure concentration in aquatic pelagic compartments	When Flue Dust is emitted to surface water the following happens. Some Flue Dust constituents (sulphate and chloride salts from sodium, potassium, calcium and magnesium) are highly or moderate soluble and will remain in suspension in water, These chloride and sulphate salts are naturally occurring in sea water and groundwater. The amount in groundwater depends on the geological soil formation and varies between different areas, On the other hand, some constituents react with water and form highly insoluble inorganic hydration products. Due to the hydration reaction, the pH of the water 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 (CO_2), the bicarbonate ion (HCO_3^-) and the carbonate ion (CO_3^{2-}).
Exposure concentration in sediments	A risk assessment for the sediment compartment is considered as not relevant and therefore not included. When Flue Dust is emitted to this compartment the following happens. Some Flue Dust constituents are inert and insoluble (calcite, quartz, clay minerals), they are naturally occurring minerals and will have no impact on the sediment. On the other hand, some constituents react with water and form highly insoluble inorganic hydration products. Moreover, these products have no bio-accumulation potential. Other constituents are highly soluble and will remain in suspension in water.
Exposure concentrations in soil and groundwater	When Flue Dust is emitted to the soil and groundwater compartments the following happens. Some Flue Dust constituents are inert and insoluble (calcite, quartz, clay minerals), moreover, they are naturally occurring minerals and will have no impact on the soil. On the other hand, some Flue Dust constituents (sulphate and chloride salts from sodium, potassium, calcium and magnesium) are moderate or highly soluble and will remain in groundwater. These chloride and sulphate salts are naturally occurring in sea water and ground water. The amount in groundwater depends on the geological soil formation and is therefore variable. Some other constituents react with water and form highly insoluble inorganic products. Due to the hydration reaction, the pH of the groundwater may increase, depending on the buffer capacity of the groundwater. The higher the buffer capacity of the groundwater, 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 (CO_2), the bicarbonate ion (HCO_3^-) and the carbonate ion (CO_3^{2-}).

Exposure concentration in atmospheric compartment	A risk assessment for the air compartment is considered as not relevant and therefore not included. When Flue Dust particles are emitted to air, they will sediment or washed out by rain in a reasonably short time frame. Thereby, the atmospheric emissions end up in soil and water.
Exposure concentration relevant for the food chain (secondary poisoning)	A risk assessment for secondary poisoning is not required, because bioaccumulation in organisms is not relevant for Flue Dust, which is an inorganic substance.

4 Guidance for the DU (downstream user) to evaluate whether he/she is working inside the boundaries set out by the ES

Occupational exposure (health)

A 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 their own that their operational conditions and implemented technical-organizational measures for risk management are adequate and efficient.

This must be supported by the actual guarantee that the exposure respects the limit set out according to the processes and/or activities identified by the PROCs (listed under Section 1), with a DNEL inhalation of 1 mg/m³ (as respirable dust).

If measured data is not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the working exposure associated with the inhalable fraction.

Important note: The DU must be aware of the fact that, apart from the long-term DNEL (given above for respirable dust), a DNEL for acute effects also exists at a level value equal to 4 mg/m³.

By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also complied with (according to *R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2).*

Please note that if the MEASE is used to calculate workers' exposure (relating to the inhalable fraction), the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %)

Environmental exposure

For assessment of the exposure, a systematic approach is recommended:

- Tier 1: collect information on effluent pH and the contribution of flue dust to any change; if the pH is above 9 due to the predominant contribution of flue dust, suitable preventive measures need to be adopted.
- Tier 2: collect information on receiving body of water pH after the discharge point; the pH must not exceed the value of 9.
- Tier 3: sample and measure the pH in the receiving water, after the discharge point. If the pH is below 9, safe use is reasonably demonstrated, and the ES ends here. If the pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralization, thereby avoiding any environmental impacts arising from the dispersion of flue dust during the various production and use phases.