1. Identification of the substance or mixture and of the company undertaking.

1.1. Product identifier.
Portland Cement Clinker.

<table>
<thead>
<tr>
<th>Substance</th>
<th>EINECS</th>
<th>CAS</th>
<th>Reference number C&amp;L notification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland cement clinker</td>
<td>266-043-4*</td>
<td>65997-15-1</td>
<td>02-2119682167-31-0000</td>
</tr>
</tbody>
</table>

* Entry is referred to as Cement, Portland, chemicals but actually describes Portland cement clinker.

Cement clinker is exempt from registration (Art. 2.7 (b) and Annex V.10 of REACH).

1.2. Relevant identified uses of the substance or mixture and uses advised against.
Portland cement clinker is used for the production of common cements or other hydraulic binders in industrial installations.

Cement and hydraulic binders are used in the production of building materials and in construction by professional users or consumers.
<table>
<thead>
<tr>
<th>Category of Process (PROC)</th>
<th>Identified Uses- Use Description</th>
<th>Manufacture/Formulation of Building and construction materials</th>
<th>Professional/Industrial use of cementitious materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Use in closed, continuous process with occasional controlled exposure</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>Use in closed batch process</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>Mixing or blending in batch process for formulation of preparations and articles</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>8b</td>
<td>Transfer of substance or preparation from/to vessels/large containers at dedicated facilities</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>9</td>
<td>Transfer of substance or preparation into small containers</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>14</td>
<td>Production of preparations or articles by tabletting, compression, extrusion, pelletisation</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>26</td>
<td>Handling of solid inorganic substances at ambient temperature</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

1.3. Details of the supplier of the safety data sheet.
Company name: CEMENTOS LEMONA, S.A.
Location of the Plant: Lemona
Full address: Arraibi, 40 48330 Lemona (Vizcaya)
Telephone number: 94 487 22 55
E-mail address of the person responsible for the SDS: lemona@lemona.com

1.4. Emergency telephone number.
Call the medical emergency telephone number of your location or the universal emergency telephone number 112 and tell the operator the details of this data sheet.

2. Hazards identification
2.1. Classification of the substance or mixture.
2.1.1. According to Regulation (EC) Number 1272/2008

<table>
<thead>
<tr>
<th>Hazard class</th>
<th>Hazard category</th>
<th>Classification procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin irritation</td>
<td>2</td>
<td>On the basis of test data</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td>1</td>
<td>On the basis of test data</td>
</tr>
<tr>
<td>Skin sensitisation</td>
<td>1</td>
<td>On the basis of literature survey</td>
</tr>
<tr>
<td>Specific target organ toxicity single exposure respiratory tract irritation</td>
<td>3</td>
<td>On the basis of literature survey</td>
</tr>
</tbody>
</table>

Hazard statements
H318: Causes serious eye damage
H315: Causes skin irritation
H317: May cause an allergic skin reaction
H335: May cause respiratory irritation

2.1.2. According to Directive 1999/45/EC

Xi (Irritant)
R36/37/38: Irritating to respiratory system and skin
R41: Risk of serious damage to eyes
R43: May cause sensitization by skin contact

Portland cement clinker dust may cause irritation of the respiratory system. When Portland cement clinker accidently comes into contact with water or when clinker or clinker dust becomes damp, a strong alkaline solution is produced. Due to the high alkalinity, wet Portland cement clinker may provoke skin and eye irritation. It may also cause an allergic reaction in some individuals due to the soluble Cr (VI) content.

2.2. Label elements

2.2.1. According to Regulation (EC) Number 1999/45/CE

Xi Irritant
R36/37/38: Irritating to respiratory system and skin
R43: May cause sensitisation by skin contact
S2: Keep out of reach of children
S22: Do not breathe dust
S24/25: Avoid contact with skin and eyes
S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S36/37/39: Wear suitable protective clothing, gloves and eye/face protection
S46: If swallowed, seek medical advice immediately and show this container label

2.3. Other hazards

Portland cement clinker does not meet the criteria for PBT or vPvB in accordance with Annex XIII of REACH (Regulation (EC) Number 1907/2006).

3. Composition/Information on componentes

3.1. Substances

Portland cement clinker is a UVCB substance (Substances of Unknown or Variable composition. Complex reaction products or Biological materials) consisting of 4 main clinker phases, namely tri- and dicalcium-silicates (3CaO.SiO₂ and 2CaO.SiO₂), tricalcium-aluminate (3CaO.Al₂O₃) and tetracalcium-aluminoferite (4CaO.Al₂O₃.Fe₂O₃), usually together with some unreacted CaO.
(free lime). It is made by mineralogical transformation of a precisely specified mixture of raw materials based on oxides of calcium, silicon, aluminium and iron and small quantities of other elements.

<table>
<thead>
<tr>
<th>IUPAC name</th>
<th>EC number</th>
<th>CAS number</th>
<th>Mol. Formula</th>
<th>Typical conc. (%w/w)</th>
<th>Conc. Range (%w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tricalcium silicate</td>
<td>235-336-9</td>
<td>12168-85-3</td>
<td>3CaO.SiO₂</td>
<td>63</td>
<td>0.85</td>
</tr>
<tr>
<td>Dicalcium silicate</td>
<td>233-107-8</td>
<td>10034-77-2</td>
<td>2CaO.SiO₂</td>
<td>15</td>
<td>0.85</td>
</tr>
<tr>
<td>Tetracalcium aluminoferrite</td>
<td>235-094-4</td>
<td>12068-35-8</td>
<td>4CaO.Al₂O₃.Fe₂O₃</td>
<td>10</td>
<td>0.30</td>
</tr>
<tr>
<td>Tricalcium aluminate</td>
<td>234-932-6</td>
<td>12042-78-3</td>
<td>3CaO.Al₂O₃</td>
<td>10</td>
<td>0.20</td>
</tr>
<tr>
<td>Calcium oxide (free lime)</td>
<td>215-138-9</td>
<td>1305-78-8</td>
<td>CaO</td>
<td>1</td>
<td>0.10</td>
</tr>
<tr>
<td>Magnesium oxide</td>
<td>215-171-9</td>
<td>1309-48-4</td>
<td>MgO</td>
<td>0.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

4. First aid measures

4.1. Description of first aid measures

**General notes**
No personal protective equipment is needed for first aid responders. First aid workers should avoid contact with wet cement or wet cement containing preparations.

**Following contact with eyes**
Do not rub eyes in order to avoid possible cornea damage as a result of mechanical stress. Remove contact lenses if any. Incline head to injured eye, open the eyelid(s) widely and flush eye(s) immediately by thoroughly rinsing with plenty of clean water for at least 20 minutes to remove all particles (if possible, use isotonic water 0.9% NaCl). Contact a specialist of occupational medicine or an eye specialist.

**Following skin contact**
For dry cement, remove and rinse abundantly with water. For wet cement, wash skin with plenty of water. Remove contaminating clothing, footwear, watches, etc. and clean thoroughly before re-using them. Seek medical treatment in all cases of irritation or burns.

**Following inhalation**
Move the person to fresh air. Dust in throat and nasal passages should clear spontaneously. Contact a physician if irritation persists or later develops or if discomfort, coughing or other symptoms persist.

**Following ingestion**
Do not induce vomiting. If the person is conscious, wash out mouth with water and give plenty of water to drink and get immediate medical attention or contact the anti poison centre.
4.2. **Most important symptoms and effects, both acute and delayed**

**Eyes:** Eye contact with cement (dry or wet) may cause serious and potentially irreversible injuries.

**Skin:** Cement may have an irritating effect on moist skin (due to sweat or humidity) after prolonged contact or may cause contact dermatitis after repeated contact.

Prolonged skin contact with wet cement or wet concrete may cause irritation and contact sensitization.

For more details see Reference (1).

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

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

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

When contacting a physician, take this Safety Data Sheet with you.

5. **Fire-fighting measures**

5.1. **Extinguishing media**

Portland cement clinker is not flammable.

5.2. **Special hazards arising from the substance or mixture**

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

5.3. **Advice for fire-fighters**

Clinker poses no fire-related hazards. No need for special protective equipment for fire fighters.

6. **Accidental release measures**

6.1. **Personal precautions, protective equipment and emergency procedures**

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

6.1.1. **For non-emergency personnel**

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

6.1.2. **For emergency responders**

Emergency procedures are not required. However, respiratory protection is needed in situations with high dust level.

6.2. **Environmental precautions**

Do not wash Portland cement clinker down sewage and drainage systems or into bodies of water (for example, streams).

6.3. **Methods and material for containment and cleaning up**

Collect the spillage in a dry state if possible.

Use dry clean-up methods such as vacuum clean-up or vacuum extraction (industrial portable units, equipped with high efficiency air filters (EPA and HEPA, UNE-EN 1822-1:2010) or equivalent technique). Never use compressed air.
Ensure that the workers wear appropriate personal protective equipment and prevent dust from spreading. Avoid inhalation of Portland cement clinker and contact with skin. Place spilled materials into a container for future use.

6.4. **Reference to other sections**
See sections 8 and 13 for more details.

7. **Handling and storage**

7.1. **Precautions for safe handling**
Do not handle or store near food and beverages or smoking materials.

7.1.1. **Protective measures**
Follow the recommendations as given under Section 8.
To clean up dry Portland cement clinker, see Subsection 6.3.

**Measures to prevent fire:**
Not applicable.

**Measures to prevent aerosol and dust generation:**
Do not sweep. Use dry cleanup methods such as vacuum clean-up or vacuum extraction, which do not cause airborne dispersion.

**Measures to protect the environment:**
No particular measures.

7.1.2. **Information on general occupational hygiene**
No not handle or store near food and beverages or smoking materials.
In dusty environment wear dust mask and protective goggles.
Use protective gloves to avoid skin contact.

7.2. **Conditions for safe storage, including any incompatibilities**
Portland cement clinker should be stored under waterproof, dry (i.e. with internal condensation minimised) conditions, clean and protected from contamination.

**Engulfment hazard:** Portland cement clinker can build-up or adhere to the walls of a confined space. The clinker can release, collapse or fall unexpectedly. To prevent engulfment or suffocation, do not enter a confined space, such as a silo, bin, bulk truck, or other storage container or vessel that stores or contains Portland cement clinker without taking the proper safety measures.
When pile storage, unstable walls or slopes can be formed that suppose a risk of landslide.
Do not use aluminum containers due to incompatibility of the materials.

7.3. **Specific end use(s)**
No additional information for the specific end uses (see section 1.2).
8. Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>Name of value limit</th>
<th>Type of value limit</th>
<th>Value (at 8h TWA)</th>
<th>Units</th>
<th>Legal references</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust (insoluble or little soluble)</td>
<td>VLA-ED Inhalible fraction</td>
<td>10</td>
<td>mg/m³</td>
<td>“Lista de Exposición Profesional para agentes químicos de España” from INSHT.</td>
</tr>
<tr>
<td>Dust (insoluble or little soluble)</td>
<td>VLA-ED Respirable fraction</td>
<td>3</td>
<td>mg/m³</td>
<td>ORDEN itc/2585/2007 “Lista de Exposición Profesional para agentes químicos de España” from INSHT.</td>
</tr>
<tr>
<td>Portland cement</td>
<td>VLA-ED Inhalible fraction</td>
<td>10</td>
<td>mg/m³</td>
<td>“Lista de Exposición Profesional para agentes químicos de España” from INSHT.</td>
</tr>
</tbody>
</table>

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Measures to reduce generation of dust and to avoid dust propagating in the environment such as dedusting, exhaust ventilation, and dry clean-up methods which do not cause airborne dispersion.

<table>
<thead>
<tr>
<th>Exposure Scenario</th>
<th>PROC*</th>
<th>Exposure</th>
<th>Localised controls</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial manufacture/formulation of hydraulic building and construction materials</td>
<td>2,3</td>
<td>Duration is not restricted (up to 480 minutes per shift, 5 shifts a week)</td>
<td>A) not required or B) generic local exhaust ventilation</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>14,26</td>
<td></td>
<td></td>
<td>- 78%</td>
</tr>
<tr>
<td></td>
<td>5,8b,9</td>
<td></td>
<td>A) general ventilation or B) generic local exhaust ventilation</td>
<td>17% 78%</td>
</tr>
</tbody>
</table>

* PROC are identified uses and defined in section 1.2.

8.2.2. Individual protection measures such as personal protection equipment

**General:** Do not eat, drink or smoke when working with cement to avoid contact with skin or mouth.
Immediately after working with cement or cement-containing materials, workers should wash or shower or use skin moisturizers.
Remove contaminated clothing, footwear, watches, etc. and clean thoroughly before re-using them.

**Eye/face protection:**

Wear approved glasses or safety goggles according to EN 166 when handling dry or wet Portland cement clinker to prevent contact with eyes.

**Skin protection:**

Use impervious, abrasion and alkali resistant gloves (made of low soluble Cr (VI) containing material), boots, closed long sleeved protective clothing as well as skin care products (including barrier creams) to protect the skin from prolonged contact with wet Portland cement clinker.
**Respiratory protection:**

When a person is potentially exposed to dust levels above exposure limits, use appropriate respiratory protection. The type of respiratory protection should be adapted to the dust level and conform to the relevant EN standard, (for example UNE EN149, UNE EN 140, UNE EN 14387, UNE EN 1827 or national standard).

**Thermal hazards:**

Not applicable.

<table>
<thead>
<tr>
<th>Exposure Scenario</th>
<th>PROC*</th>
<th>Exposure</th>
<th>Specification of respiratory protective equipment (RPE)</th>
<th>RPE Efficiency assigned protection factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial manufacture/formulation of hydraulic building and construction materials</td>
<td>2,3</td>
<td>Not required</td>
<td>A) P1 mask (FF, FM) or B) Not required</td>
<td>FPA = 4</td>
</tr>
<tr>
<td></td>
<td>14,26</td>
<td>La duración no está limitada (hasta 480 min/burn; 5 turnover/semana)</td>
<td>A) P2 mask (FF, FM) or B) P1 mask (FF, FM)</td>
<td>FPA = 10</td>
</tr>
<tr>
<td></td>
<td>5,8b,9</td>
<td></td>
<td></td>
<td>FPA = 4</td>
</tr>
</tbody>
</table>

*PROC are identified uses and defined in section 1.2.*

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 program including training of the workers.

8.2.3. **Environmental exposure controls**

Environmental exposure control for the emission of clinker particles into air has to be in accordance with the available technology and regulations for the emission of general dust particles.

Environmental exposure control is relevant for the aquatic environment as emissions of clinker in the different life-cycle stages (production and use) mainly apply to ground and waste water. The aquatic effect and risk assessment cover the effect on organisms/ecosystems due to possible pH changes related to hydroxide discharges. The toxicity of other dissolved inorganic ions is expected to be negligible compared to the potential pH effect.

Any effects that might occur during production and use would be expected to take place on a local scale. The pH of effluent and surface water should not exceed 9. Otherwise it could have an impact on municipal sewage treatment plants (STPs) and industrial waste water treatment plants (WWTPs). For that assessment of the exposure, a stepwise approach is recommended:

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

Tier 2: Retrieve information on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the value of 9.

Tier 3: Measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably remonstrated. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralization, thus ensuring safe use.
of cement during production or use phase. No special emission control measures are necessary for the exposure to the terrestrial environment.

9. Physical and chemical properties
9.1. Information on basic physical and chemical properties
This information applies to the whole mixture.
   a) Appearance: Portland cement clinker is a grey or white, granular inorganic solid material.
   b) Odour: odourless.
   c) Odour threshold: no odour threshold, odourless.
   d) pH: (T° = 20 °C; in water, water-solid ratio 1:2): basic in between 11 y 13.5
   e) Melting point: > 1250 °C
   f) Initial boiling point and boiling range: not applicable as under normal atmospheric conditions, melting point >1250 °C.
   g) Flash point: not applicable as is not a liquid.
   h) Evaporation rate: not applicable as is not a liquid.
   i) Flammability (solid, gas): not applicable as is a solid which is non combustible and does not cause or contribute to fire through friction.
   j) Upper/lower flammability or explosive limits: not applicable as is not a flammable gas.
   k) Vapour pressure: not applicable as melting point >1250 °C.
   l) Vapour density: not applicable as melting point >1250 °C.
   m) Relative density: 2.75 - 3.20 g/cm³ at 20 °C; apparent density 0.9-1.5 g/cm³ at 20 °C
   n) Solubility(ies) in water: (T 20 °C): slight (0.1-1.5 g/l)
   o) Partition coefficient: n-octanol/water: not applicable as is inorganic mixture
   p) Auto-ignition temperature: not applicable (no phyrohletic – no organo-metallic, organo-metalloid or organo-phosphine bindings or of their derivatives, and no other pyrophoric constituent in the composition).
   q) Decomposition temperature: not applicable as no organic peroxide present
   r) Viscosity: not applicable as not a liquid
   s) Explosive properties: Not applicable. Not explosive or pyrotechnic. Not in itself capable by chemical reaction of producing gas at such temperature and pressure and at such a speed as to cause damage to the surroundings. Not capable of a self-sustaining exothermic chemical reaction.
   t) Oxidising properties: Not applicable as does not cause or contribute to the combustion of other materials.

9.2. Other information
Not applicable.

10. Stability and reactivity
10.1. Reactivity
When mixed with water, Portland cement clinker will harden into a stable and hardy mass in normal environments.

10.2. Chemical stability
Portland cement clinker is stable as long as it is properly stored (see Section 7). Contact with incompatible materials should be avoided.
Wet clinker is alkaline and incompatible with acids, with ammonium salts, with aluminum or other non-stable metals. Clinker dissolves in hydrofluoric acid to produce corrosive silicon tetrafluoride gas. Clinker reacts with water to form silicates and calcium hydroxide. Silicates in clinker react with powerful oxidizers such as fluorine, boron trifluoride, chlorine trifluoride, managanese trifluoride, and oxygen difluoride.

10.3. **Possibility of hazardous reactions**
Not applicable.

10.4. **Conditions to avoid**
Humid conditions during storage may cause lump formation and loss of product quality.

10.5. **Incompatible materials**
Acids, ammonium salts, aluminum or other non-noble metals.

10.6. **Hazardous decomposition products**
Portland cement clinker will not decompose into any hazardous products.

11. **Toxicological information**
11.1. **Information on toxicological effects**

<table>
<thead>
<tr>
<th>Hazard class</th>
<th>Cat</th>
<th>Effect</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity – dermal</td>
<td>-</td>
<td>Limit test, rabbit, 24 hours contact, 2,000 mg/kg body weight – no lethality. Cement used in the study is Portland cement with over 90% Portland cement clinker. Based on available data, the classification criteria are not met.</td>
<td>(2)</td>
</tr>
<tr>
<td>Acute toxicity – inhalation</td>
<td>-</td>
<td>No acute toxicity by inhalation observed. Based on available data, the classification criteria are not met.</td>
<td>(8)</td>
</tr>
<tr>
<td>Acute toxicity – oral</td>
<td>-</td>
<td>No indication of oral toxicity from studies with cement kiln dust. Cement kiln dust contains Portland cement clinker in varying amounts. Based on available data, the classification criteria are not met.</td>
<td>Literature survey</td>
</tr>
<tr>
<td>Skin corrosión/irritation</td>
<td>2</td>
<td>Portland cement clinker in contact with wet skin may cause thickening, cracking or fissuring of the skin. Prolonged contact in combination with abrasion may cause severe burns. Cement used in the study is Portland cement with over 90% Portland cement clinker.</td>
<td>(2) Human experience</td>
</tr>
<tr>
<td>Serious eye damage/irritation</td>
<td>1</td>
<td>Portland cement clinker caused a mixed picture of corneal effects and the calculated irritation index was 128. Direct contact with Portland cement clinker may cause corneal damage by mechanical stress, immediate or delayed irritation or inflammation. Direct contact by larger amounts of dry Portland cement clinker or splashes of wet clinker may cause effects ranging from moderate eye irritation (for example conjunctivitis or blepharitis) to chemical burns and blindness.</td>
<td>(10), (11)</td>
</tr>
<tr>
<td>Skin sensitisation</td>
<td>1</td>
<td>Some individuals develop eczema upon exposure to wet clinker dust, caused either by the high pH which induces irritant contact dermatitis after prolonged contact, or by an immunological reaction to soluble Cr (VI) which elicits allergic contact dermatitis.</td>
<td>(3), (4)</td>
</tr>
<tr>
<td>Hazard class</td>
<td>Cat</td>
<td>Effect</td>
<td>Reference</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Respiratory sensitisation</td>
<td>-</td>
<td>There is no indication of sensitization of the respiratory system. Based on available data, the classification criteria are not met.</td>
<td>(1)</td>
</tr>
<tr>
<td>Germ cell mutagenity</td>
<td>-</td>
<td>No indication. Based on available data, the classification criteria are not met.</td>
<td>(12), (13)</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>-</td>
<td>No casual association has been established between Portland cement clinker exposure and cancer. The 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 for humans but which cannot be assessed conclusively because of a lack of data. In vitro or animal studies do not provide indications of carcinogenicity that are sufficient to classify the agent with one of the other notations). Based on available data, the classification criteria are not met. Portland cement contains over 90% Portland cement clinker.</td>
<td>(1), (14)</td>
</tr>
<tr>
<td>Reproductive toxicity</td>
<td>-</td>
<td>Based on available data, the classification criteria are not met.</td>
<td>No evidence from human experience</td>
</tr>
<tr>
<td>STOT – single exposure</td>
<td>3</td>
<td>Portland cement clinker dust may irritate the throat and respiratory tract. Coughing, sneezing, and shortness of breath may occur following exposures in excess of occupational exposure limits. Overall, the pattern of evidence 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.</td>
<td>(1)</td>
</tr>
<tr>
<td>STOT – repeated exposure</td>
<td>-</td>
<td>There is an indication of COPD. The effects are acute and due to high exposures. No chronic effects or effects at low concentration have been observed. Based on available data, the classification criteria are not met.</td>
<td>(15)</td>
</tr>
<tr>
<td>Aspiration hazard</td>
<td>-</td>
<td>Not applicable as Portland cement clinker are not used as an aerosol.</td>
<td>-</td>
</tr>
</tbody>
</table>

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

**11.2. Medical conditions aggravated by exposure**

Portland cement clinker may dust aggravate existing respiratory system disease(s) and/or medical conditions such as emphysema or asthma and/or existing skin and/or eye conditions.
12. Ecological information

12.1. Toxicity
The product is not hazardous to the environment. Ecotoxicological test with Portland cement – whose composition is very closely related to that of clinker - on Daphnia magna (Reference (4)) and Selenastrum coli (Reference (5)) have shown little toxicological impact. Therefore LC50 and EC50 values could not be determined (Reference (6)). There is no indication of sediment phase toxicity (Reference (7)). The addition of large amounts of Portland cement clinker to water may, however, cause a rise in pH and may, therefore, be toxic to aquatic life under certain circumstances.

12.2. Persistence and degradability
Not relevant as Portland cement clinker is an inorganic material. After hydration, Portland cement clinker presents no toxicity risks.

12.3. Bioaccumulative potential
Not relevant as Portland cement clinker is an inorganic material. After hydration Portland cement clinker lumps present no toxicity risks.

12.4. Mobility in soil
Not relevant as cement is an inorganic material. After hydration Portland cement clinker lumps present no toxicity risks.

12.5. Results of PBT and vPvB assessment
Not relevant as Portland cement clinker is an inorganic material. After hydration, Portland cement clinker lumps present no toxicity risks.

12.6. Other adverse effects
Not relevant.

13. Disposal considerations

13.1. Waste treatment methods
Cement clinker may always be reused, so waste treatment methods do not apply. Do not dispose of into sewage systems or surface waters.

14. Transport information
Portland cement clinker is not covered by the international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID); no classification is required. No special precautions are needed apart from those mentioned under Section 8.

14.1. UN number
Not relevant.

14.2. UN proper shipping name
Not relevant.

14.3. Transport hazard class(es)
Not relevant.
14.4. **Packing group**  
Not relevant.

14.5. **Environmental hazards**  
Not relevant.

14.6. **Special precautions for user**  
Not relevant.

14.7. **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**  
Not relevant.

15. **Regulatory information**

15.1. **Safety, Health and environmental regulations/legislation specific for the substance mixture**

Cement clinker is exempt from registration (Art. 2.7 (b) and Annex V.10 of REACH).

**Social Dialogue Agreement on Crystalline Silica**
The so-called «Good practice guides” with contain advice on safe handling practices can be found from [http://www.nepsi.eu/good-practice-guide.aspx](http://www.nepsi.eu/good-practice-guide.aspx). These good practices have been adopted under the Social Dialogue “Agreement on Workers’ Health Protection through the Good Handling and Use of Crystalline Silica and Products Containing it by Employee and Employer European sectorial associations, among which is CEMBUREAU. The Spanish cement industry voluntarily adopted the terms of the Agreement and has elaborated a protocol of application specific to the Spanish cement industry [http://www.oficemen.com/reportajePag.asp?id_rep=139](http://www.oficemen.com/reportajePag.asp?id_rep=139).

15.2. **Chemical Safety Assessment**

No chemical safety assessment has been carried out.

16. **Other information**

16.1. **Indication of changes**

To this edition has been incorporated the classification and labeling of Portland cement clinker according to CLP Regulation and updates the Safety Data Sheet to new Annex II of REACH “Requirements for the elaboration of the safety data sheets” that has been modified by EU Regulation Number 453/2010 dated May 20\textsuperscript{th} 2010.

16.2. **Abbreviations and acronyms**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ADR/RID</td>
<td>European Agreements on the transport of Dangerous goods by Road/Railway</td>
</tr>
<tr>
<td>CAS</td>
<td>Chemical Abstracts Service</td>
</tr>
<tr>
<td>CLP</td>
<td>Classification, labelling and packaging (Regulation (EC), number 1272/2008)</td>
</tr>
<tr>
<td>DNEL</td>
<td>Derived no-effect level</td>
</tr>
<tr>
<td>EC50</td>
<td>Half Maximal effective concentration</td>
</tr>
<tr>
<td>ECHA</td>
<td>European CHeMicals Agency</td>
</tr>
<tr>
<td>EINECS</td>
<td>European Inventory of Existing Commercial chemical Substances</td>
</tr>
<tr>
<td>EPA</td>
<td>Type of high efficiency air filter</td>
</tr>
<tr>
<td>COPD</td>
<td>Chronic Obstructive Pulmonary Disease</td>
</tr>
<tr>
<td>FDS</td>
<td>Safety data sheet</td>
</tr>
<tr>
<td>FPA</td>
<td>Assigned protection factor</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<td>--------------</td>
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<tr>
<td>FFP</td>
<td>Filtering facepiece against particles (disposable)</td>
</tr>
<tr>
<td>HEPA</td>
<td>Type of high efficiency air filter</td>
</tr>
<tr>
<td>IATA</td>
<td>International Air Transport Association</td>
</tr>
<tr>
<td>IMDG</td>
<td>International agreement on the Maritime transport of Dangerous Goods LC50</td>
</tr>
<tr>
<td>LC50</td>
<td>Median lethal dose</td>
</tr>
<tr>
<td>MS</td>
<td>Member State</td>
</tr>
<tr>
<td>PBT</td>
<td>Persistant, bio-accumulative and toxic</td>
</tr>
<tr>
<td>PNEC</td>
<td>Predicted no-effect concentration</td>
</tr>
<tr>
<td>PROC</td>
<td>Process category</td>
</tr>
<tr>
<td>RE</td>
<td>Repeated exposure</td>
</tr>
<tr>
<td>REACH</td>
<td>Registration, Evaluation and Authorization of Chemicals</td>
</tr>
<tr>
<td>STOT</td>
<td>Specific Target Organ Toxicity</td>
</tr>
<tr>
<td>UVCB</td>
<td>Sustancias de composición desconocida o variable, productos de reacción complejos o materiales biológicos</td>
</tr>
<tr>
<td>VLE-MP</td>
<td>Exposure limit value-weighted average in mg by cubic meter of air</td>
</tr>
<tr>
<td>vPvB</td>
<td>Very persistant, very bio-accumulative</td>
</tr>
<tr>
<td>VLA/ED</td>
<td>Environmental limit value for daily professional exposure</td>
</tr>
</tbody>
</table>

**16.3. Hey literatura references and sources of data.**

9. TNO report V8801/02, An acute (4-hour) inhalation toxicity study with Portland Cement Clinker CLP/GHS 03-2010-fi ne in rats, July 2010 – unaudited draftapproved
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


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) Prospective monitoring of exposure and lung function among cement workers, Interim report of the study after the data collection of Phase I-II 2006-2010, Hilde Notø, Helge Kjuus, Marit Skogstad and Karl-Christian Nordby, National Institute of Occupational Health, Oslo, Norway, March 2010,

16.4. Training advice.
In addition to health, safety and environmental training programs for their workers, companies must ensure that workers read, understand and apply the requirements of this SDS.

16.5. Disclaimer.
The information on this data sheet reflects the currently available knowledge and is reliable provided that the product is used under the prescribed conditions and in accordance with the application specified on the packaging and/or in the technical guidance literature. Any other use of the product, including the use of the product in combination with any other product or any other process, is the responsibility of the user.
It is implicit that the user is responsible for determining appropriate safety measures and for applying the legislation covering his/her own activities.
This safety data sheet about cement cancels and replaces version 1.0 of November 2008 and the safety data sheet of Portland cement clinker of Cementos Lemona dated February 2010.