

# Material Safety Data Sheet

## Portland cement

### 1. Product and Company Identification

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#### Product Information

- **Product name:** Portland Cement
- **CAS no.:** 65997-15-1
- **EC no.:** 266-043-4
- **Uses:** Cement is used as a binder in concrete and mortars that are widely used in construction. Cement is distributed in bags, jumbo bags, and bulk shipments.

### 2. Hazards Identification

#### 2.1. Emergency Overview

Portland cement is a light gray powder that poses little immediate hazard. A single short-term contact with the dry powder is not likely to cause serious harm. However, contact of sufficient duration with wet Portland cement can cause serious, potentially irreversible tissue (skin or eye) destruction in the form of chemical (caustic) burns, including third degree burns. The same type of destruction can occur if wet or moist areas of the body come in contact with dry Portland cement.

#### 2.2. Label elements

According to the Regulation (EC) No 1272/2008 (CLP)



Danger

#### Hazard Statements

- H318** Causes serious eye damage
- H315** Causes skin irritation
- H317** May cause an allergic skin reaction
- H335** May cause respiratory irritation

#### 2.3. Potential Health Effects:

##### 2.3.1. Relevant routes of exposure

Eye contact, skin contact, inhalation, and ingestion.

##### 2.3.2. Effects resulting from eye contact

Contact with airborne dust may cause immediate or delayed irritation or inflammation. Eye contact by larger amounts of dry powder or splashes of wet Portland cement may cause effects ranging from moderate eye irritation to chemical burns and blindness. Such exposures require immediate first aid (see section V) and medical attention to prevent significant damage to the eye.

##### 2.3.3. Effects resulting from skin contact

Exposed persons may not feel discomfort until hours after a hazardous risk exposure has ended and significant injury has occurred. Consequently, the only effective means of avoiding skin injury or illness involves minimizing skin contact, particularly with wet cement.

Contact with dry Portland cement may cause drying of the skin with consequent mild irritation or more significant effects attributable to aggravation of other conditions. Dry Portland cement contacting wet skin or contact with moist or wet Portland cement may cause more severe effects including thickening, cracking or fissuring of the skin. Prolonged

contact can cause severe skin damage in the form of caustic chemical burns. Some individuals may exhibit an allergic response upon skin contact with Portland cement, possibly due to trace amounts of chromium. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers. Persons already sensitized may react to their first contact with the product. Other persons may first experience this effect after years of contact with Portland cement products.

#### 2.3.4. Effects resulting from inhalation

Contact with Portland cement may cause irritation to the moist mucous membranes of the nose, throat, and upper respiratory system. It may also leave unpleasant deposits in the nose.

Portland cement may contain trace amounts of free crystalline silica. Prolonged contact with respirable free crystalline silica may aggravate other lung conditions. It also may cause delayed lung injury including silicosis, a disabling and potentially fatal lung disease, and/or other diseases. Crystalline silica is now classified by IARC as a known human carcinogen

(Group 1). NTP has characterized respirable silica as “reasonably anticipated to be a carcinogen”.

#### 2.3.5. Effects resulting from ingestion

Although small amounts of dust are not known to be harmful, ill effects are possible if larger quantities are consumed. Portland cement should not be eaten.

#### 2.3.6. Medical conditions which may be aggravated by inhalation or dermal exposure

Pre-existing upper respiratory and lung diseases.

Unusual (hyper) sensitivity to hexavalent chromium (chromium+6) salts.

### 3. Composition, Information on Ingredients

#### 3.1. Hazardous Ingredients

COMPONENT	EXPOSURE LIMITS		
	OSHA PEL (8-Hour TWA)	ACGIH TLV-TWA (2001)	NIOSH REL(8-Hour TWA)
Portland Cement Clinker (CAS #65997-15-1) 90 to 95% by weight	5 mg respirable dust/m <sup>3</sup> 15 mg total dust/m <sup>3</sup>	10 mg total dust/m <sup>3</sup>	5 mg respirable dust/m <sup>3</sup> 10 mg total dust/m <sup>3</sup>
Calcium sulfate (CAS #7778-18-9) [Gypsum (CAS #13397-24-5)] 0 to 10% by weight	5 mg respirable dust/m <sup>3</sup> 15 mg total dust/m <sup>3</sup>	10 mg total dust/m <sup>3</sup>	5 mg respirable dust/m <sup>3</sup> 10 mg total dust/m <sup>3</sup>
Iron oxide (CAS #1309-37-1) 0 to 15% by weight	10 mg /m <sup>3</sup>	5 mg /m <sup>3</sup>	5 mg /m <sup>3</sup>
Calcium carbonate (CAS #1317-65-3) 0 to 5% by weight	5 mg respirable dust/m <sup>3</sup> 15 mg total dust/m <sup>3</sup>	10 mg total dust/m <sup>3</sup>	5 mg respirable dust/m <sup>3</sup> 10 mg total dust/m <sup>3</sup>
Magnesium oxide (CAS #1309-48-4) 0 to 5% by weight	5 mg respirable dust/m <sup>3</sup> 15 mg total dust/m <sup>3</sup>	10 mg total dust/m <sup>3</sup>	----
Calcium oxide (CAS #1306-78-8) 0 to 5% by weight	5 mg /m <sup>3</sup>	2 mg /m <sup>3</sup>	2 mg /m <sup>3</sup>
Crystalline silica (CAS #14808-60-7) 0 to 0.1% by weight	10 mg respirable dust/m <sup>3</sup> %SiO <sub>2</sub> + 2  30 mg respirable dust/m <sup>3</sup> %SiO <sub>2</sub> + 2	0.05 mg respirable quartz/m <sup>3</sup>	0.05 mg respirable quartz/m <sup>3</sup>

### 3.2. Trace Ingredients

Due to the use of substances mined from the earth's crust, trace amounts of naturally-occurring, potentially harmful constituents may be detected during chemical analysis. Portland cement may contain up to 0.75% insoluble residue. A small amount of this residue includes free crystalline silica. Portland cement also may contain trace (<0.05%) amounts of chromium salts or compounds (including hexavalent chromium) or other metals (including nickel compounds) found to be hazardous or toxic in some chemical forms. These metals are present mostly as trace substitutions within the principal minerals. Other trace constituents may include potassium and sodium sulfate compounds.

## 4. First Aid

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### 4.1. Eyes

Immediately flush eyes thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Consult physician immediately.

### 4.2. Skin

Wash skin with cool water and pH-neutral soap or a mild detergent intended for use on skin. Seek medical treatment in all cases of prolonged contact with wet cement, cement mixtures, liquids from fresh cement products, or prolonged wet skin contact with dry cement.

### 4.3. Inhalation of airborne dust

Remove person to fresh air. Seek medical help if coughing and other symptoms do not subside. Inhalation of large amounts of Portland cement requires immediate medical treatment.

### 4.4. Ingestion

Do not induce vomiting. If conscious, have the victim drink plenty of water and seek medical attention immediately.

## 5. Fire Fighting Measures

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**Flash point:** Portland cement is non-combustible and non-explosive

**Combustibility:** Not applicable

**Flammable and explosive limits:** Not applicable

**Auto ignition temperature:** Not applicable

**Extinguishing media:** Not applicable

**Special firefighting procedures:** Not applicable

**Hazardous combustion products:** Not applicable

**Unusual fire and explosion hazards:** None

## 6. Accidental Release Measures

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

**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.

**For emergency responders:** Emergency procedures are not required. However, respiratory protection is needed in situations with high dust levels

### 6.2. Environmental precautions

Do not wash cement into sewage, drainage systems, or bodies of water (e.g., streams).

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

Collect the spillage in a dry state if possible.

**Dry cement:** Use cleanup methods such as vacuum clean-up or vacuum extraction (Industrial portable units, equipped with high efficiency air filters (EPA and HEPA filters, EN 1822-1:2009) or equivalent technique) which do not cause airborne

dispersion. Never use compressed air. Alternatively, wipe-up the dust by mopping, wet brushing or by using water sprays or hoses (fine mist to avoid that the dust becomes airborne) and remove slurry. If not possible, remove by slurrying with water (see wet cement). When wet cleaning or vacuum cleaning is not possible and only dry cleaning with brushes can be done, ensure that workers wear the appropriate personal protective equipment and prevent dust from spreading. Avoid inhalation of cement and contact with skin. Place spilled materials into a container. Solidify before disposal as described under Section 13.

**Wet cement:** Clean up wet cement and place in a container. Allow material to dry and solidify before disposal as described under Section 13.

## 7. Handling & Storage/Spill Procedures

### 7.1. Handling and storage

Keep Portland cement dry until use. Normal temperatures and pressures do not affect the material. Promptly remove dusty clothing or clothing which is wet with cement fluids and launder before reuse. Wash thoroughly after contact with dust or wet cement mixtures or fluids.

### 7.2. Spill procedure

Collect dry material using a scoop. Avoid cleanup methods that cause dust to become airborne. Avoid breathing the dust. Scrape up wet material and place in appropriate container. Allow the material to dry before disposal. Do not attempt to wash Portland cement down drains. Emergency procedures are not required. Small amounts of material can be disposed of as common waste or returned to the original container for later use. Large volumes may require special handling. Dispose of waste material according to local, state and federal regulations.

## 8. Exposure Controls, Personal Protection

### 8.1. Skin protection

Avoid contact with unhardened Portland cement products. If contact occurs, wash affected area with soap and water. Where prolonged exposure to unhardened Portland cement may occur, wear impervious, abrasion, and alkali-resistant gloves and boots, and protective clothing to eliminate skin contact. Where required, wear boots that are impervious to water to avoid foot and ankle contact.

The use of barrier creams is advised. However, barrier creams should not be a substitute for gloves. After working with cement, workers should wash with a pH neutral soap. If clothing becomes saturated with wet concrete, it should be removed and replaced with clean, dry clothing.

### 8.2. Respiratory protection

Avoid actions that can cause the cement dust to become airborne. Use local or general ventilation to control exposures below applicable exposure limits. Use NIOSH/MSHA (under 30 CFR 11) approved respirators in poorly ventilated areas. Note: Respirators and filters purchased after July 10, 1998 must be certified under 42 CFR 84.

### 8.3. Ventilation

Use local exhaust or general dilution ventilation to control exposure within acceptable limits.

### 8.4. Eye protection

Wear safety glasses with side shields or tight-fitting goggles. In extremely dusty environments, wear unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when working with Portland cement or fresh cement products.

## 9. Physical And Chemical Properties

### 9.1. Physical Data

Physical State	Nodules to Dust
Boiling point:	Not applicable – Portland cement is a powdered solid
Vapor pressure:	Not applicable – Portland cement is a powdered solid
Vapor density:	Not applicable – Portland cement is a powdered solid
Solubility:	Slight (0.1 – 1.0%)



Specific gravity (H <sub>2</sub> O = 1)	3.15
Evaporation rate:	Not applicable – Portland cement is a powdered solid
Appearance and odor:	Gray or white powder, no odor
Melting point:	Not applicable

## 9.2. Chemical Compounds

Chemical State	Range (%)	Chemical Abstract Service (ABS)
TRI CALICUM SILICATE - 3CaO.SiO <sub>2</sub>	20 -- 70	12168-85-3
DI-CALCIUM SILICATE – 2CaO.SiO <sub>2</sub>	10 -- 60	10034-77-2
TETRA-CALICUM ALUMINO FERRITE- 4CaO.AL <sub>2</sub> O <sub>3</sub> .Fe <sub>2</sub> O <sub>3</sub>	5 -- 15	12068-35-8
CALCIUM SULFATE DIHYDRATE - CaSO <sub>4</sub> .2H <sub>2</sub> O	2 -- 10	778-18-9, (13397-24-5)
TRICALCIUM ALUMINATE - 3CaO.AL <sub>2</sub> O <sub>3</sub>	1 -- 15	12042-78-3
CALCIUM CARBONATE – CaCO <sub>3</sub>	0 -- 5	1317-65-3
MAGNESIUM OXIDE - MgO	0 -- 4	1309-48-4
Calcium Oxide – CaO	0 – 0.2	1305-78-8
Crystalline Silica	0 – 0.2	14808-60-7
Chromates	0 – 0.005	VARIOUS

## 9.3. Formula

Portland cement consists of finely ground Portland cement clinker mixed with a small amount of calcium sulfate dihydrate (gypsum). The final product may also contain small amounts of liquid or solid grinding aids. Portland cement clinker is a sintered material produced by heating to high temperature (greater than 1200° Celsius) a mixture of substances such as limestone and shales or clays mined from the earth's crust, with possible additions of waste materials. The substances manufactured are essentially hydraulic calcium silicates contained in a crystalline mass, not separable into the individual components.

## 9.4. Trace Elements

Trace amounts of naturally occurring harmful chemicals might be detected during chemical analysis. For example, under ASTM standards, Portland cement may contain up to 0.75% of insoluble residue, some of which may be free crystalline silica. Other trace constituents may include calcium oxide (also known as free lime or quick lime), free magnesium oxide, potassium and sodium sulfate compounds, and chromium and nickel compounds.

## 10. Stability and Reactivity

**Stability:** Stable, keep dry until used.

**Conditions to avoid:** Unintentional contact with water

**Incompatibility:** Wet Portland cement is alkaline. As such it is incompatible with acids, Ammonium salts and aluminum metal. Reaction with these substances may occur.

**Liberates:** hydrogen gas.

**Hazardous decomposition:** Will not spontaneously occur. Addition of water results in hydration and produces: (caustic) calcium hydroxide.

**Hazardous polymerization:** Will not occur.

## 11. Toxicological Information

Hazard class	Cat	Effect
Acute toxicity - dermal	-	Limit test, 24 hours contact, 2,000 mg/kg body weight – no lethality. Based on available data, the classification criteria are not met.
Acute toxicity- inhalation	-	No acute toxicity by inhalation observed. Based on available data, the classification criteria are not met.
Acute toxicity - oral	-	No indication of oral toxicity from studies with cement kiln dust. Based on available data, the classification criteria are not met.



Skin corrosion/ irritation	2	Cement in contact with wet skin may cause thickening, cracking, or fissuring of the skin. Prolonged contact in combination with abrasion may cause severe burns.
Serious eye damage/irritation	1	Portland cement clinker caused a mixed picture of corneal effects and the calculated irritation index was 128. Common cements contain varying quantities of Portland cement clinker, fly ash, blast furnace slag, gypsum, natural pozzolans, burnt shale, silica fume and limestone. Direct contact with cement may cause corneal damage by mechanical stress, immediate or delayed irritation or inflammation. Direct contact by larger 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
Skin sensitisation	1B	Some individuals may develop eczema upon exposure to wet cement 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. The response may appear in a variety of forms ranging from a mild rash to severe dermatitis and is a combination of the two above mentioned mechanisms. If the cement contains a soluble Cr (VI) reducing agent and as long as the mentioned period of effectiveness of the chromate reduction is not exceeded, a sensitising effect is not expected.
Respiratory sensitisation	-	There is no indication of sensitisation of the respiratory system. Based on available data, the classification criteria are not met.
Germ cell mutagenicity	3	No indication. Based on available data, the classification criteria are not met
Carcinogenicity	-	No causal association has been established between Portland cement 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). Based on available data, the classification criteria are not met
Reproductive toxicity	-	Based on available data, the classification criteria are not met.

## 12. Ecological Information

**Toxicity:** The product is not hazardous to the environment. Ecotoxicological tests with Portland cement on *Daphnia magna*, and *Selenastrum coli*, have shown little toxicological impact. Therefore, LC50 and EC50 values could not be determined. There is no indication of sediment phase toxicity. The addition of large amounts of cement to water may however cause a rise in pH and may therefore be toxic to aquatic life under certain circumstances.

**Persistence and degradability:** Not relevant. After hardening, cement presents no toxicity risks.

**Bio accumulative potential:** Not relevant. After hardening, cement presents no toxicity risks.

**Mobility in soil:** Not relevant. After hardening, cement presents no toxicity risks.

**Results of PBT and vPvB assessment:** Not relevant. After hardening, cement presents no toxicity risks. Other adverse effects: Not relevant.

## 13. Disposal Considerations

Do not dispose of into sewage systems or surface waters.

**Product - cement that has exceeded its shelf life EWC entry:** 10 13 99 (wastes not otherwise specified) (and when demonstrated that it contains more than 0.0002% soluble Cr (VI)): shall not be used/sold other than for use in controlled closed and totally automated processes or should be recycled or disposed of according to local legislation or treated again with a reducing agent.

**Product - unused residue or dry spillage EWC entry:** 10 13 06 (Other particulates and dust) Pick up dry unused residue or dry spillage as is. Mark the containers. Possibly reuse depending upon shelf-life considerations and the requirement to avoid dust exposure. In case of disposal, harden with water and dispose according to "Product – after addition of water, hardened"

**Product – slurries:** Allow to harden, avoid entry in sewage and drainage systems or into bodies of water (e.g. streams) and dispose of as explained below under “Product - after addition of water, hardened”

**Product - after addition of water, hardened:** Dispose of according to the local legislation. Avoid entry into the sewage water system. Dispose of the hardened product as concrete waste. Due to the inertisation, concrete waste is not a dangerous waste.

**EWC entries:** 10 13 14 (waste from manufacturing of cement – waste concrete or concrete sludge) or 17 01 01 (construction and demolition wastes - concrete).

**Packaging:** Completely empty the packaging and process it according to local legislation.

**EWC entry:** 15 01 01 (waste paper and cardboard packaging).

## 14. Transport Information

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**Hazardous materials description/proper shipping name:** Portland cement is not hazardous.

**Hazard class:** Not applicable

**Identification number:** Not applicable

**Required label text:** Not applicable

**Hazardous substances/reportable quantities (RQ):** Not applicable

## 15. Regulatory Information

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### 15.1. Safety, Health, And Environmental Regulations/Legislation Specific for The Substance or Mixture

#### EU regulatory information

Cement is a mixture according to REACH and is not subject to registration. Cement clinker is exempt from registration (Art 2.7 (b) and Annex V.10 of REACH).

The marketing and use of cement is subject to a restriction on the content of soluble Cr (VI) (REACH Annex XVII point 47 Chromium VI compounds):

1. Cement and cement-containing mixtures shall not be placed on the market, or used, if they contain, when hydrated, more than 2 mg/kg (0.0002 %) soluble chromium VI of the total dry weight of the cement.
2. If reducing agents are used, then without prejudice to the application of other Community provisions on the classification, packaging and labelling of substances and mixtures, suppliers shall ensure before the placing on the market that the packaging of cement or cement-containing mixtures is visibly, legibly and indelibly marked with information on the packing date, as well as on the storage conditions and the storage period appropriate to maintaining the activity of the reducing agent and to keeping the content of soluble chromium VI below the limit indicated in paragraph 1.
3. By way of derogation, paragraphs 1 and 2 above shall not apply to the placing on the market for, and use in, controlled closed and totally automated processes in which cement and cement-containing mixtures are handled solely by machines and in which there is no possibility of contact with the skin.

### 15.2. Chemical Safety Assessment

No chemical safety assessment has been carried out for this mixture by the supplier.

## 16. Other Information

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- **Preparation/Revision Date:** 01/01/2024
- **Revision Number:** 02

### 16.1. 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.

## 16.2. Abbreviations and Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
ASTM	American Society for Testing and Materials
CAS	Chemical Abstract Service
CFR	Code of Federal Regulations
DOT	Department of Transportation
FR	Federal Register
ft3	Cubic foot (cubic feet)
IARC	International Agency for Research on Cancer
m3	Cubic meter(s)
MSDS	Materials Safety Data Sheet
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
RQ	Reportable Quantity
TLV	Threshold Limit Volume
TWA	Time Weighted Average