

18 Types and Properties of Cement

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Cement: Powdery hydraulically inorganic cementitious materials are mixed with water to form paste, which can harden in air or in water, and can firmly bind sand, stone and other materials together.

The combination of early lime and pozzolanic is similar to modern lime pozzolanic cement. The concrete made by cementing crushed stone with it not only has higher strength after hardening, but also can resist the erosion of fresh water or brine. For a long time, cement, as an important cementitious material, has been widely used in civil construction, water conservancy, national defense and other projects.



China's Cement Production 2014-2018 (million tons)

Cement Types on the Basis of Properties and Use

- **Normal Cement:** Commonly used in civil engineering. Normal cement mainly refers to 6 kinds: Portland Cement, Ordinary Portland Cement, Portland Slag Cement, Portland Pozzolana Cement, Portland-Fly Ash Cement and Portland Composite Cement.
- **Special Cement:** Cement for special use. For example: G-grade oil well cement, road Portland cement.
- **Characteristic Cement:** A kind of cement with outstanding performance. Such as: Rapid hardening Portland Cement, Low Heat Slag Portland Cement, Expansive



Cement Types according to Hydraulics Components

1. Silicate Cement, commonly known as Portland cement;
2. Aluminate Cement;
3. Sulfoaluminate Cement;
4. Ferroaluminate Cement;
5. Fluoroaluminate Cement;
6. Phosphate Cement;
7. Cement with volcanic ash or latent hydraulics and other active materials as main components.

Cement Types on the Basis of Characteristics

- **Rapid Hardness** (hydraulicity): It can be divided into: Rapid hardening cement and Ultra-rapid hardening cement.
- **Heat of Hydration**: It can be divided into: Medium heat cement and Low heat cement.
- **Sulfate Resistance**: It can be divided into: Sulfate resistance and High sulfate resistance.
- **Expansibility**: It can be divided into: Expansive cement, and Self-stress cement.
- **High Temperature Resistance**: Aluminate cement is classified by the content of alumina.



| 18 Common Types of Cement [Properties & Use]

(1) Silicate Cement

Hydraulic cementitious materials made of silicate cement clinker, 0%~5% limestone or granulated blast furnace slag and appropriate amount of gypsum grinding are called Portland cement, which is divided into P.I and P.II.

(2) Ordinary Portland Cement

Portland cement clinker, 6%~20% mixtures, and appropriate amount of gypsum grinding made of hydraulic cementitious materials, known as ordinary Portland cement (abbreviated as ordinary cement), code name: P.O.

(3) Slag Cement

Hydraulic cementitious material made of Portland cement clinker, 20%~70% granulated blast furnace slag and appropriate amount of gypsum grinding is called Portland slag cement, code name: P.S.

(4) Pozzolanic Cement

Portland cement clinker, 20%~40% pozzolanic mixing and appropriate amount of gypsum grinding made of water-hard cementitious materials, known as volcanic ash Portland cement, code name: P.P.

(5) Fly Ash Cement

Portland cement clinker, 20%~40% fly ash and appropriate amount of gypsum grinding made of water-hard cementitious materials, known as Portland-fly ash cement, code name: P.F.

(6) Hydrophobic Cement

Hydrographic cement is made of the water repelling material that contain Ca, Al with the ordinary cement during the process of cement producing. Manily used for the structures: dams, water tanks, spillways etc.

(7) Composite Cement

Hydraulic cementitious materials made of Portland cement clinker, 20%~50% two or more specified mixtures and appropriate gypsum are called composite Portland cement (abbreviated as composite cement), code P.C.

(8) Medium Heat Cement

Hydraulic cementitious material with moderate hydration heat is prepared by grinding Portland cement clinker with appropriate composition and adding appropriate amount of gypsum.

(9) Low Heat Cement

Hydraulic cementitious materials with low hydration heat are prepared by grinding Portland cement clinker with appropriate composition and adding appropriate amount of gypsum.

(10) Rapid Hardening Cement

Hydraulic cementitious materials with faster initial strength increase rate. The content of tricalcium silicate and tricalcium aluminate is higher than that of ordinary cement. It has large specific surface area, fast hardening and high initial strength. Mainly used in emergency repair engineering.

(11) Sulphates Resisting Cement

Cement with good sulphate corrosion resistance is made of Portland cement clinker, adding appropriate amount of gypsum. Mainly used to reduce the risk of sulphate attack on concrete.

(12) White Cement

White cement is made by adding appropriate amount of gypsum to Portland cement clinker with low iron oxide content.

(13) Road Cement

Which is made by grinding of Portland cement clinker, 0%~10% active mixture material and appropriate gypsum, is called Portland Road cement (referred to as road cement).

(14) Masonry Cement

The low-grade cement mainly used for masonry mortar is made from active mixtures, Portland cement clinker and gypsum.

(15) Oil Well Cement

Portland cement clinker, gypsum and mixtures made of suitable minerals are suitable for cementing oil and gas wells at a certain well temperature.

(16) Gypsum Slag Cement

The granulated blast furnace slag is used as the main component material, and the cement is made by adding appropriate amount of gypsum, Portland cement clinker or lime.

(17) Expansive Cement

This type cement will not shrink during and after hardening. Just expands slightly with time. Expansion cement is mainly used to produce waterproof mortar and waterproof concrete. It is suitable for reinforcing structure, pouring machine base or consolidating foot bolts.

(18) High Alumina Cement

High alumina cement is a kind of cementitious material with rapid hardening, high strength, heat resistance and corrosion resistance. High alumina cement is mainly used in urgent projects, such as road and special emergency repairs, etc. It can also be used in winter construction projects.