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СОВРЕМЕННЫЕ ТЕХНОЛОГИИ В ПРОИЗВОДСТВЕ ПОРТЛАНДЦЕМЕНТА

Аннотация: В статье рассмотрены основные процессы производства портландцемента, в том числе производство сухого, мокрого и смешанного цемента на основе современных технологий.

Ключевые слова: производство клинкера, измельчение клинкера вместе с добавками в мелкий порошок, шлам, комочки материала

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MODERN TECHNOLOGIES IN PORTLAND CEMENT PRODUCTION

Annotation: The article discusses the main processes of Portland cement production, including dry, wet and mixed cement production based on modern technology

Keywords: production of clinker, grinding of clinker together with additives into fine powder, slurry, lumps of material

The production of Portland cement consists of the following main processes: obtaining raw materials and preparing a mixture of raw materials, heating the mixture until it melts and forming clinker, grinding the clinker together with additives into a fine powder, etc.

Raw materials for the production of Portland cement are usually mined in open pits near the cement plant. Rail and suspension roads and road transport are used to deliver raw materials to factories.

Depending on the quality of raw materials and the type of heating furnaces, raw materials are prepared by wet or dry method. In wet preparation, additives are ground and mixed in water, the mixture in the form of a liquid mass (slurry) is heated: in dry preparation, raw material additives are ground, mixed and heated in dry form.

The following processes occur during cooking of raw materials.

Hot gases dry the slurry and form pellets. As the material progresses, at 500-750oC, organic matter burns out and dehydration (release of chemically bound water from the clay constituent) begins, during which the plasticity and binding properties are lost. Balls of material break down into a mobile powder. At a temperature of 750-800oC and above, a reaction begins between its constituents in a solid material. As the temperature rises, their intensity begins to increase. The individual particles of the powder are combined with each other and grains of different sizes are formed.Calcium carbonate passing through the temperature zone of 900-1000oC is dissociated, and carbon dioxide and carbon dioxide gas are released with combustion products. Calcium oxide SaO reacts chemically with alumina, iron oxide and silicon dioxide. The chemical bonding reaction of calcium oxide in the solid state takes place sufficiently intensively at 1200-1250oC, in which the following chemical compounds are formed: 2CaO .SiO2 (two-calcium silicate) 3CaO .Al2O3 (three-calcium silicate) and 4CaO . Al2O3 .Fe2O3 (aluminum ferrite with four calcium atoms), CaO and 2CaO .SiO2 until the solution is saturated at a temperature above 13oC

partially soluble; in the molten state, they react and form tricalcium silicate 3CaO .SiO2 - the main mineral of portland cement. The process of formation of tricalcium silicate, which is separated from the liquid phase in the form of crystals, usually occurs at a temperature of about 1450oC. When the temperature drops to 1300oC, the liquid phase solidifies, the fusion process ends.

For cooling to 80-100oC, clinker - 15-25 mm gray-green colored grains are sent to the refrigerator, from there they are brought to the warehouse and stored for 1-2 weeks. As a result of aging, the small amount of calcium oxide in the clinker is extinguished by air moisture, and the hardness of the clinker grains decreases, which

in turn makes it easier to fill and allows for a uniform change in volume during cement hardening. provides

Clinker is crushed in multi-chamber ball mills.In order to adjust the holding time of portland cement in the process of filling, 2-5% of gypsum stone and various additives provided for in the technological process are added to it.

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