SPECIAL CEMENT FOR CONCRETE PREPATION

Teshaboeva Nodira Djuraevna

Star.prep.kaf. "GKK"

Email: teshaboyevanodira1953@gmail.com

No'monov Jasurbek Omonullo o'g'li

(ORCID: 0000-0001-6778-8232)

Email: jasurbeknumonov@gmail.com

Fergana Polytechnic Institute

ABSTRACT

The article shows that the cement mixture is a system consisting of various components, including cement, additives and water, during production.

Key words: cement, concrete, components, frost resistance.

Cement mortar at the time of manufacture is a system consisting of various components, including cement, aggregates and water. Each solid in this case, regardless of its distribution in the system, is a separate phase - a set of individual parts of the system that are identical in composition and in all properties and are separated from the rest of the system by an interface.Cement grains are very small, their dimension is in the range of 1 - 100 microns. The more dispersed the substance, the greater its specific surface area. The specific surface of cements, determined by the method of air permeability, is on average 3000 - 3500 cm^2 / g. This method is quite suitable for practical needs and is widely used. However, it is not accurate enough, since it does not reflect the true surface of cement grains, which usually have a developed microrelief, microcracks and microcracks. [1-3]

In our case, each grain of sand can be separated from similar particles by interlayers of water or cement particles, but since the composition and properties of sand grains practically do not differ from one another, they are considered as one phase. Similarly, all particles of cement introduced into the composition of the mortar are considered to be another solid phase.Cement mortar at the time of manufacture is a system consisting of various components, including cement, aggregates and water. Each solid in this case, regardless of its distribution in the system, is a separate phase - a set of individual parts of the system that are identical in composition and in all properties and are separated from the rest of the system by an interface.For this reason, the real microgeometric surface of a cement particle is many times larger than its apparent geometric surface. Significantly more reliable are the indicators of the specific surface, determined by the adsorption of nitrogen. According to these methods, the specific surface area of modern cements averages about 20,000 cm2/g. It is easy to calculate that the total surface of the cement powder used to produce 1 m3 of concrete at a cement consumption of 400 kg/m3 is 800,000 m2. And if we add here the surface of aggregates (their specific surface is much less than that of cement, but it still needs to be taken into account), then it turns out that the surface of particles of solid phases in 1 m3 of concrete mixture approaches 1 km^2.Let us assume that 180-190 liters of water are introduced in the manufacture of 1 m3 of concrete mix. Theoretically, such an amount of water should be distributed over this huge surface of solid particles and a practically homogeneous mixture should be obtained. Mixing of components is one of the important tasks in the technology of concretes and mortars. [3-5]

In particular, uniform mixing contributes to a more complete and rapid physical and chemical interaction of cement particles with water. Water introduced into the concrete mixture during its manufacture should, first of all, evenly and, moreover, with the thinnest layer, moisten the entire total surface of cement particles and aggregates.

But water has a significant surface tension, i.e. between the water molecules located in its surface layer at the phase boundary, there are significant cohesive forces that prevent it from flowing. Since, of all geometric bodies, a ball has the smallest ratio of surface to volume, i.e., it has the most "economical" surface development, it is precisely due to surface tension that a liquid in a free state tends not to spread into a thin film, but to form spherical drops. Including the conclusion, Therefore, the large surface tension of water prevents its uniform distribution on the solid particles of the concrete mixture.Some substances, namely surfactants (hereinafter referred to as surfactants) are able to significantly reduce the surface tension of water at a given interface, for example, at the interfaces water - solid, water - air. An example of the manifestation of the action of these substances, known to everyone since childhood, is soap bubbles. It is possible to inflate a soap bubble even more than 20 cm in diameter. This can be done because there are surfactant molecules on both sides of the thinnest water shell of the bubble. [5-8]

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