

RESEARCH OF ADDITIVES INFLUENCE ON STRUCTURE OF GYPSUM-CEMENT MATERIALS STRUCTURE AND FEATURES

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***Abstract** – The increasing demand in construction of dry construction mixes of the wide nomenclatures which are used not only for finishing works, but also for technology of various elements of buildings and rooms. In this regard application of local and multicomponent binding components in low-branded products production is necessary technical and economic action which is caused by low specific expenses, short production cycle and large supplies of raw materials.*

***Аннотация** – Растет спрос в строительстве сухих строительных смесей из широких номенклатур, которые используются не только для отделочных работ, но и для техники различных элементов зданий и помещений. В этом отношении применения локальных и многокомпонентных компонентов в низких фирменных продуктов производства необходимо технико-экономическое действие, которое обусловлено низкими удельными затратами, коротким производственным циклом и большими запасами сырья.*

I. Introduction. There is provided the program of further increase in production of the knowledge-intensive, high-tech and competitive production in Kazakhstan 2030 strategy.

At the same time the issues of import substitution and country industrialization for the purpose of production with a high value added resolves performance this task. Therefore receiving of qualitative production demands the wide-ranging scientific studies statement for the purpose of identification of optimum technological modes of construction materials [1].

The interest of builders to dry mixes is caused by good technological properties, availability of input products and favorable operational characteristics.

The nomenclature of the dry construction mixes which is presented in the construction market of Kazakhstan is rather wide.

The most complex task for science in the field of construction industry causes expediency of production of highly effective multicomponent construction materials. Among multicomponent materials undoubted interest is represented by sulfate-containing compositions.

As a rule they are allocated with property of fast curing. Depending on components structures and ratios and other technology factors they also can possess various construction and technical qualities.

II. Type style and fonts. Sulfate-containing compositions on the basis of a Portland cement and gypsum binding material could become very perspective for low-branded products.

The similar materials called gypsum-cement-puzzling have showed that gypsum binding materials features is saved in case of their curing. There are some merits of the Portland cement at its insignificant consumption. Thanks to it at gypsum-cement compositions receiving the fuel and energy expenses are reduced in 2,3-3,1, metal consumption of the equipment - in 2,0-2,4, and specific capital investments - in 1,7-1,8 times in comparison with production of a Portland cement.

The formations of steady structure at joint curing of a Portland cement and gypsum binding and also operational reliability and durability of gypsum cement materials in the damp environment had probabilistic character. From the above follows that systematic and deep studying of processes of curing and destruction of gypsum-cement-puzzling stone depends on amount of sulfate of calcium.

Physic mechanical indicators and operational properties of construction materials are defined by curing process. Passing in interaction with each other processes structure - and hydrate formations describe the important phenomenon. Especially at initial stages of curing because it defines further binding material using.

At application such binding it is necessary to be based that generates changes of speed of hydrate - and structurizations which provide receiving a construction material in their structural mechanical description with the set construction and technical properties.

III. Ease of Use. Production of usual dry cement and sand mixes industrially does not allow to use effectively the equipment and to provide a modern level of quality of mixes. Only existence of special chemical additives in a mix allows completely realize advantages of these materials as at a stage of transportation, organization and the production technology of works, so at the operation stage.

The data analysis of floors destruction showed that in most cases the reason of floor destruction is the low-quality condition of a coupler: existence of the weakened zone in the top layer, high humidity, and low adhesion of coupler material to adjacent elements of the floor.

Among all loadings perceived mechanical, thermal, aggressive, chemical and others floors, the mechanical shock influences most influence on its durability.

For ensuring high durability of a floor it is necessary that the coupler was dry, and had a strong and equal surface, possessed high adhesion to adjacent elements of a floor.

One of ways of formation of binding material structure is application of effective additives. Application of such effective substances is created by conditions for improvement micro and macrostructures of construction materials. It is proved under production conditions and created actions improve durability, frost resistance and durability of an artificial stone.

IV. Prepare your paper before styling. Additives of this group, on performance of functional values are directed on interaction of mixes cement + semi-water plaster + puzzling additive. The main direction is considered the interaction of sulfate of calcium, Portland cement and the puzzling additive which give binding properties to system.

Researchers showed that applied additives possess hydraulic activity, in suspensions with an additive of a ceramist dust concentration of hydroxide of calcium 0,85 g/l, and with powder of brick fight of 0,87 g/l (tab. 1). It is visible from the table that at cement hydration without an additive in 5 days saturated solution of hydroxide of calcium is reached. According to literary data it is known that solubility of hydroxide of calcium in the distilled water makes 1,2-1,4 g/l.

Table 1. Change concentration of hydroxide of calcium at hydration

Material structure	Hydration duration, days.			
	5	7	14	28
Gypsum and Portland cement	1,41	1,48	1,51	1,52
Gypsum, Portland cement and ceramist dust	0,34	0,85	0,80	0,73
Gypsum, Portland cement and brick powder	0,94	0,87	0,81	0,75

According to V.N. Yunga at cement interaction with water concentration of hydroxide of calcium in solution can be much higher and reach 1,6-1,7 g/l. At a choice of an additive and definition of an optimum ratio of components data of 28-daily decrease in concentration of hydroxide of calcium and also its initial indicators are important.

The role of additives as the integral component of modern concrete and means of technological regulation increases adequately growth of efficiency of their influence on hydration and structuration of cement, property of concrete mixes and concrete. As it is noted above additives allowed to develop successfully new concepts progressive construction technologies.

Recently the composite structure of additives considerably became complicated. Complex additives are some reagents of the various nature and action mechanisms, each of which has the special function. The main principle of structures formation of complex additives is an achievement of demanded effects in technological and economic plans. It is difficult task as mechanisms of influence of many additives are not clear, their compatibility with cements [3], etc. is not always provided. It is extremely difficult to have full, as symmetric, information on properties of cement and additives for the operational solution of production tasks.

Compositions of an additive entered into structure get out strictly according to functional characteristics. Functional properties of an additive is determined by their influence on processes of structuration of a stone as some of them give certain construction and technical properties, and some give them binding properties, etc.

Strong structure formation of a composite material depends on optimum quantity of components. For example, the increase in amount of semi-water sulfate of calcium reduces the structural durability of cement $C_3S-C_3A-H_2O$ system.

To formation of durability of a composite material in the course of curing, especially at formation of sulfate aluminum silicate structure. The defining role is played by silica containing components.

Essential decrease water-cement ratio at the expense of increase in mobility of mortar mix is observed at complex influence of an additive. The complex additive provides decrease in water requirement of a mix for 25 % that there corresponds in accordance with GOST as highly effective plasticizing additive of the first groups. Using of the modified dry mixes allows realizing technologies during the performing of plaster works, the device of floors, at alignment of walls and ceilings. This advantage of the modified dry mixes increases productivity and reduces materials consumption. However there are increased requirements for drawing to material on crack resistance and resistance to external physical impacts.

Conclusions. Physic mechanical indicators and operational properties of construction materials are defined by curing process. Passing in interaction with each other processes structure and hydrate formations describe the important phenomenon, especially it is defined at initial stages of curing because from it extent of further use of binding material. At application such binding materials it is necessary to be based that generates speed changes hydrate and structurizations which provide receiving a construction material in their structural mechanical description with the set construction and technical properties.

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