EFFECTIVE FIRE-RESISTANT CONCRETES

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In order to reduce the cost of construction products and reduce the costs of natural raw materials, in recent years, industrial and household waste has been very actively used in the manufacturing technology of construction structures, which is economically expedient [1].
Improvement of physical and mechanical and special properties of concrete can be solved by using effective technological methods, as well as complex active chemical mineral additives [2]. Natural mineral additives require additional costs for their production, which is not economically feasible.

In works [2-3], the authors proved that using industrial waste from thermal stations and enterprises of the chemical industry of Ukraine, it is possible to obtain effective construction products for special purposes. It should be taken into account that there are 12 thermal stations operating on the territory of Ukraine, which annually send about 10 million tons of ash and slag waste to landfills, and the specific weight of their use in construction materials technology is 5–8 times less than in foreign countries [4-5].

To use industrial waste, it is necessary to first investigate the structure and their chemical composition. The chemical composition of fly ash depends on a complex of factors: morphological properties of fuel combustion, fineness of grinding, chemical composition and ash content of coal; temperatures in the combustion zone; time spent in the burning zone, etc. [6-7].

In order to obtain effective fire-resistant concrete, it is necessary to use a composite material based on phosphogypsum binders. Using complex technology of physico-chemical activation of such industrial waste as phosphogypsum, fly ash, metal sludge, a fire-resistant metal ash phosphate binder was obtained. In their works [8-9], the authors established that the binder is obtained from finely dispersed components with a low content of the free liquid phase, which later has a positive effect on the fire-resistant properties of construction products.

As a result of our research, fire-resistant concrete samples were obtained, the compressive strength of the samples varies from 6 to 18 MPa, the average density of the material is 680 - 1950 kg/m3, respectively. Tests of the products' resistance to temperature effects showed that when samples are heated to 800°C, mass loss ranges from 1.2 to 7.8%. Such a composite material can be classified as special concrete, it can be used for the production of fire-resistant concrete.

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