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ENSURING THE RESISTANCE OF CONCRETE UNDER CONDITIONS OF AGGRESSIVE ENVIRONMENT

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ABSTRACT
The article discusses the increase in the corrosion resistance of a concrete surface under the action of external aggressive factors by modifying it with protective coatings.

Keywords: Concrete structures, corrosion, structure, aggressive factors, curing.

INTRODUCTION
Among the general requirements for concrete and reinforced concrete structures, durability is important, which, in addition to having initial quality characteristics, must satisfy the requirements of safety and serviceability with an appropriate degree of reliability during a given service life under various types of influence, such as loading, climatic and technological factors. , alternating freezing and thawing, aggressive influence, etc. Increasing the durability of building structures and the service life of structures is one of the main principles of the sustainable development strategy, which consists in minimizing the cost of energy and material resources in the process of construction and operation of building structures with a decrease in the negative impact on the environment.
The impact of the environment leads to corrosion of concrete structures of buildings and structures.
Especially significant are the losses from corrosion at the enterprises of the chemical, coke-chemical, metallurgical, coal and meat and dairy industries, which are characterized by the presence of strongly pronounced aggressive environments. Therefore, the protection of structures based on concrete from corrosion is one of the important problems in solving the issues of ensuring the durability of buildings and structures.
Generalization of research results in the direction of building materials science indicates the possibility of increasing the corrosion resistance of building structures by applying a protective coating on their surface, which ensures the formation of a hydrophobic film and prevents the penetration of aggressive factors into concrete. Therefore, ensuring the reliability of operation and high durability of concrete products and structures due to the development of protective coatings to increase the corrosion resistance of concrete is one of the topical issues of modern construction [1].
The modern approach to assessing the corrosion resistance of concrete is based on providing a high density of cement stone through the introduction of structure modifiers. At the same time,

the formation of portlandite as a result of hydration of cement leads to an acceleration of corrosion processes in concrete during its operation in aggressive environments. The expediency of using filled polymer compositions to increase the durability of concrete structures is shown.

Therefore, the use of filled polymer compositions is a promising direction in the creation of protective anti-corrosion coatings that will provide the necessary durability of buildings and structures.

A significant number of works have been devoted to the development and optimization of the compositions of filled organosilicate compositions, but the issue of creating protective coatings based on starting materials is quite relevant.

The most effective way to solve the problem of increasing the corrosion resistance of concrete is to use compositions based on polymethylphenylsiloxane filled with oxide and silicate components, which are characterized by the necessary physical and mechanical properties when used in an aggressive environment.

The properties of coatings largely depend on the technological mode of application to the surface of the material during curing [2].

In the case of applying the initial composition to the surface of the material, the organic solvent evaporates, in which the polymethylphenylsiloxane resin dissolves, and the binder is completely polymerized with the formation of a strong film. Polymethylphenylsiloxane performs the function of a matrix, and the dispersed filler is aluminum, zirconium oxides, fireclay, kaolin and kaolin fiber. Depending on the type of filler and its content in the composition of the coating, its microhardness, as a criterion for the degree of curing, can vary over a wide range.

To obtain protective coatings on the surface of concrete, the influence of the curing regime on its microhardness was studied.

Under the present operating conditions of concrete materials, biological pests act in conjunction with atmospheric factors. Therefore, when studying the mechanism of destruction of polymethylphenylsiloxane coatings filled with inorganic components, it is necessary to take into account the possibility of intensifying corrosion processes due to their superposition (strengthening). However, this makes it difficult to assess the weight of the contribution of destructive factors that determine the greatest influence and reliability of predicting the protective effect. Therefore, the study of the resistance of coatings to these factors during testing allows you to remove extraneous influence and quantitatively evaluate the contribution of components to the destruction of the material.

For fine-grained uncoated concrete, aged for 180 days in an aggressive Na2SO4 environment, a fine-grained structure is characteristic, long prismatic etringite crystals are observed. Crystallization of etringite occurs mainly in micropores and on the surface of the filler, i.e. at the phase boundary, the cement stone is a filler, since the cement stone has a higher porosity on the surface of the phase boundary.

It should be noted that the structure of the cement stone of fine-grained concrete with a protective coating is represented by blocks of crystals in the form of hexagonal plates, fused in a binary position as a result of the geometric selection of crystals.

Conclusions. Using a complex of methods of physical and chemical analysis, the researchers confirmed and proved the stability of the phase composition of the outer and inner layers of protected concrete. It has been established that the microstructure of protected fine-grained concrete after testing in aggressive environments of Na2SO4 and MgCl2 is represented by portlandite, hydrosulfoaluminate, low-basic calcium hydrosilicates, calcium carbonate and etringite. The presence of portlandite in the structure of the surface of the protected cement stone confirms the high degree of corrosion protection of concrete.

LITERATURE

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