

GENERAL CHARACTERISTICS AND CLASSIFICATION OF CHEMICAL  
ADDITIVES FOR CONCRETE**Mazhidov S.R., Botirov I.Sh., Toshpulatov X.Sh.**

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*Annotation. The task of improving the efficiency and quality of concrete and reinforced concrete has been and remains very relevant and cannot be fully successfully solved without the use of chemical additives in concrete technology. Chemical additives, being one of the simplest and most accessible technological methods for improving concrete properties, can significantly reduce unit costs, improve the quality and efficiency of a wide range of reinforced concrete structures, and increase the service life of both structures and buildings and structures in general.*

*Keywords: chemical additives, concrete mix, laying, finishing, curing, shrinkage cracks, setting speed.*

The development of the construction industry in the last decade has been driven by increasing demands for the rational and efficient use of raw materials and energy resources. This affects, in principle, the development of all branches of the building materials industry, and, above all, the manufacture of prefabricated and monolithic concrete and reinforced concrete structures.

A practical solution to the problem of efficient use of raw materials and energy resources in the production of dry and ready-mixed mortar and concrete mixtures,

concrete and reinforced concrete, both precast and monolithic, is fully possible only with the extensive and comprehensive use of chemical additives.

According to experts, the share of concrete with additives in our country in the coming years should increase to 50% or more. At the same time, the main focus is, Emphasis will probably be placed on the production and use of plasticizers, complex additives for various purposes, super plasticizers and antifreeze additives. The purpose and some basic characteristics of chemical additives to concrete and their classification are discussed below. General characteristics of chemical additives Under additives for concrete and mortar in accordance with GOST 24211-2003 refers to various products introduced into concrete and mortar mixtures in order to improve their technological properties, enhance the construction and technical properties of concrete and mortar and give them new properties.

Additives are chemicals (reagents) of both organic and inorganic structures, complex or simple composition. They are introduced into the composition of concrete, as a rule, with water of creation and can have a liquid, solid or pasty state. In some cases, chemical products with a constant composition regulated by relevant regulatory documents (standards) are used as additives for concrete. These can be salts, acids, alkalis, and other chemical products. The purpose of additives is very diverse. Their number, which has found application in the production of mortar, concrete and reinforced concrete structures, is more than 300 items. There are about 1000 names of additives in the research and industrial testing stage. So wide The range of chemical additives for mortar and concrete is determined in most cases by the desire to use them to improve the properties of concrete., reducing cement consumption or reducing energy costs when production of reinforced concrete, various waste products and associated products of many industries. On the other hand, the need to search for new additives is determined by the selective nature of their modifying effect, which depends not only on the chemical composition of the additives, but also on the chemical and

mineralogical composition of cement, the fineness of its grinding, the presence and amount of alkalis in the cement.

The magnitude of the modifying effect of many additives depends on the specific consumption of cement in the concrete mix, the content and type of mineral additives, the water-cement ratio, and the modes of heat treatment of reinforced concrete structures. Thus, the choice of additives to improve the properties of concrete and the manufacturing technology of reinforced concrete structures is not an easy task. Therefore, for the correct choice of additives in relation to the specific conditions of production, the purpose of the products and the goals set require a clear understanding of the classification of additives according to their purpose and the mechanism of their action.

### **Classification of chemical additives**

The problem of using additives to modify concrete is multidimensional. There is currently no unified classification of additives to cements and concretes in world practice. Developed in different countries their own classification schemes. These schemes are based on the authors' desire to facilitate the correct choice of additives for concrete or mortar in accordance with their purpose.

In our country, in accordance with GOST 24211-2003, the most studied and widely used additives used to change the properties of concrete and mortar, depending on the main effect of exposure, are divided into three groups: The first group consists of additives that regulate the properties of ready-to-use products. the use of concrete and mortar mixtures. These include: plasticizing – water-soluble (superplasticizing, highly plasticizing, plasticizable substance); stabilizing; regulating the preservation of mobility; polarizing (absorbing air, foaming, face shaping).

The second group combines additives that change the properties of concretes and mortars: regulating the kinetics of hardening (accelerators, retarders), increasing strength; reducing permeability; increasing protective properties against steel

reinforcement; increasing frost resistance; increasing corrosion resistance (increasing sulfate resistance, increasing resistance to corrosion caused by the reaction of silica fillers with cement alkalis and additives); regulating the processes of shrinkage and expansion. The third group includes additives that give special properties to concrete and mortars: antifreeze; hydrophobic; biocidal; increasing resistance to efflorescence. The affiliation of any chemical additive, including a new one, to a particular group is determined by the criteria of effectiveness (Table) according to the methods of GOST 30459.

The effectiveness criterion is the quantitative value of the technical effect characteristic of each group of additives. For example, the first group of plasticizing additives includes additives that increase the mobility of the concrete mix from P1 (Approx = 2-4 cm) to P5 (Approx = 21 cm) without reducing the strength of concrete during all test periods. If the additive provides an increase in mobility from P1 to P4 (Approx = 16–20cm) without reducing the strength of concrete, it can be attributed to the second group of plasticizing additives. And finally, if the additive provides an increase in mobility from P1 to P3 without reducing the strength of concrete, then it should be attributed to the third group of plasticizing additives.

By introducing chemical additives into the concrete mix in the form of separate products or combinations thereof, one or more performance indicators are achieved simultaneously:

- a) reducing cement consumption by up to 12% or increasing the strength of concrete at the design age by up to 25%
- b) ; b) improving the technological properties of the concrete mix (workability, uniformity, non-delamination, etc.
- c) c) controllability of the loss of mobility of the concrete mixture over time, the speed of setting, hardening, and heat dissipation processes;
- d) d) reducing the duration of heat and moisture treatment of products up to 40%, acceleration of the time of demoulding and loading of monolithic structures;



- e) e) giving the laid concrete the ability to harden in winter without heating or warming up when it is cooled to minus 25 °C.;
- f) f) increasing the frost resistance of concrete by 2-3 times or more;
- g) g) increase the density and impermeability of concrete by 1-2 grades;
- h) h) increasing the resistance of concrete and reinforced concrete in various aggressive environments.

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