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THE ESSENCE OF THE COEFFICIENT OF VARIATION IN THE PROBABILITY APPROACH IN CHECKING THE STRENGTH OF CONCRETE AND REINFORCED CONCRETE STRUCTURES

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Abstract
The article discusses the scientific significance of the research results, scientific research and analysis of the influence of the coefficient of variation of the material on the reliability of reinforced concrete structures, the influence of the coefficient of variation of the material on the reliability of reinforced concrete structures using practical experiments, discusses the experimental results of comparing the existing structure with the normative ones and identifying inconsistencies. During the study, the scientific works of a number of scientists were studied [1-23].

Keywords: concrete and reinforced concrete, building material, destructive testing, non-destructive testing, strength class, bending strength, strength.

Introduction

According to the decrees and decrees signed by the President of the Republic of Uzbekistan, the volume of construction materials production in Uzbekistan increased in 2017-2021. The demand for construction materials produced in our country is growing not only in the local but also in the world markets. New directions were developed in the field of construction materials, and foreign investors were widely attracted to it. Based on the development trend of the construction sector of leading foreign countries, special attention was paid to the adoption of new construction materials and innovation in the sector. It is known that in recent years huge construction and construction works are being carried out in our country. Construction works are being carried out rapidly in cities and villages. At the same time, the demand for energy-efficient, import-substituting, innovative and new types of construction materials is increasing year by year. In particular, the demand for construction materials is growing day by day not only in the local but also in the world markets. In accordance with this high domestic demand, the volume of production of building materials in our country has increased significantly in recent years. In addition, in order to further expand the production of construction materials and increase the variety of products, special attention is paid to the implementation of large investment projects in this field.

In addition to optimizing the composition of concrete mixtures used for the production of concrete and reinforced concrete structures, the use of industrial waste, chemical and mineral additives in their preparation, and the purposeful management of structure formation in

hardening cement stone have been carried out. is going In this regard, in order to increase the resistance of concrete and reinforced concrete structures to the harmful effects of the environment, especially groundwater, the use of chemical and mineral additives, the provision of convenient placement of the concrete mixture, the acceleration of the initial strength of concrete and the achievement of high strength by intensifying the hydration of cement providing and at the same time increasing the strength of structural concrete, improving its cold tolerance, density and other properties is becoming important. In our republic, special attention is being paid to the development of the building materials industry, the saving of natural raw materials, the introduction of resource- and energy-saving technologies that allow the use of industrial waste in production, and the creation of corrosion-resistant concrete types.

The construction sector is the most important component of the territorial infrastructure of our country, and its activity creates the necessary conditions for a decent life of our people, ensures that houses and settlements are cozy and comfortable in all respects. The level of development and efficiency of this sector forms the corresponding quality of life of the population, reflects the standard of living and lifestyle, and serves as one of the factors of further improvement of the economic potential. All these are interrelated, and quality service is the guarantee of a healthy society. Decree of the President of the Republic of Uzbekistan No. PF-4947 of February 7, 2017 "On the Strategy of Actions for Further Development of the Republic of Uzbekistan", No. PQ-2615 of September 28, 2016 "Construction in 2016-2020 "On the program of activities for the further development of the construction materials industry" dated May 23, 2019 No. PQ-4335 "On additional measures for the rapid development of the construction materials industry" and also this the research carried out to a certain extent serves the implementation of tasks provided for in other regulatory legal documents adopted in the field.

Methods

Taking into account the modern theoretical concepts of construction materials, we can conclude that in order to moderate the structural-mechanical characteristics of reinforced concrete and increase its resistance to erosion, water-soluble polymers with a multidisciplinary orientation are used as chemical additives, hydraulically active, mixing strength can be increased due to the addition of fillers, which cause the formation of secondary raw materials of high hydration. Thus, based on the advantages listed above, the strength is increased from all sides, that is, all three periodic elements related to each other, especially the composition is moderated and the hardness is increased, resulting in an effective breakdown process. the problem of designing slow-moving, erosion-resistant concrete is raised. It is multi-functional and has the optimal composition to ensure durability of concrete. Different environments of concrete, their types are mainly found in different environments chemical, physical and mechanical types. These types should be given importance in increasing the resistance of concrete to various environments. It is concluded that all the design organizations of the present day should comply with the rules of

construction norms of the Republic of Uzbekistan and carry out their work after thoroughly studying the existing GOST requirements.

Normalized strength of concrete: the strength of concrete at the design age or the percentage of its intermediate age, specified in the regulatory or technical document from which the finished concrete mixture or construction is carried out.

Depending on the type of strength at the age of the project, the following strength classes of concrete are determined: B - concrete class for compressive strength or concrete strength class for compression; Bt is the concrete class for axial tensile strength or concrete axial tensile strength class; Btb is the concrete class for flexural tensile strength or the flexural strength class of concrete.

Required strength of concrete: The minimum permissible value of the average permissible strength of concrete in controlled batches of ready-mixed concrete mixes or structures corresponding to the standardized strength of concrete with actual uniformity.

Class of real strength of concrete: The value of the class of concrete for the strength of monolithic constructions, calculated based on the results of determining the real strength of concrete and its uniformity in the controlled batch.

Actual strength of concrete: The average value of the strength of concrete in batches of ready-mixed concrete or constructions is calculated according to the results of its determination in a controlled batch.

Sample of concrete mixture (probe): A volume of ready-made concrete mixture of the same nominal composition from which one or more control samples are produced at the same time.

A series of control samples: Several samples prepared from the same ready-mix concrete sample or selected from the same construction, cured under the same conditions and tested at the same age to determine the same type of true strength.

Batch of Concrete Mix: A volume of ready-mix concrete of one nominal composition produced or placed during a specified period of time.

Batch of monolithic constructions: A part of a monolithic construction, one or more monolithic constructions made during a certain period of time.

Batch of prefab constructions: Constructions of the same type, manufactured in a row using the same technology, from the same type of materials for a period of not more than one day.

Controlled part of a structure: A part of a structure for which the unit value of concrete strength is determined by non-destructive methods.

Structural Area: A part of a controlled structure where the concrete strength differs by more than 15% from the average strength of that structure.

Analyzed period: The average value of the coefficient of variation in concrete strength for batches of ready-mix concrete or constructions produced during this period is calculated.

Current coefficient of variation of concrete strength: The coefficient of variation of concrete strength in a controlled batch of ready-mix concrete or structures.

Average coefficient of change of concrete strength: the average value of the coefficient of change of concrete strength for the analyzed period when controlled by schemes.

Coefficient of change in strength of concrete: Coefficient of change in strength of concrete averaged for the current batch and previous controlled batches of hardened concrete or structures during control 30 according to scheme B.

Controlled period: The time during which the desired concrete strength is assumed to be constant according to the coefficient of variation for the previous analyzed period.

Current control: control of the strength of concrete of a batch of ready-mixed concrete or structures, in which the values of the uniformity of the actual strength and strength of concrete (current coefficient of variation) are calculated based on the results of the control of this batch.

Destructive methods for determining the strength of concrete: determination of concrete strength on control samples selected from the concrete mix according to GOST 10180 (State Standard 10180) or selected from constructions according to GOST 28570.

Methods of direct non-destructive testing of the strength of concrete: Determination of the strength of concrete according to GOST 22690 by "breaking through the concrete body" and "breaking the edge".

Indirect non-destructive testing methods for determining the strength of concrete: A predetermined calibration between the strength of concrete determined by one of the destructive or direct non-destructive testing methods and the indirect strength properties determined according to GOST 22690 and GOST 17624 determining the strength of concrete according to the relationship.

Coverage: The concrete volume of a monolithic structure or part of it laid during the continuous concreting of one or more batches of ready-mix concrete for a certain period of time.

Uniform strength value: The value of the actual strength of the standardized type of concrete, which is taken into account when calculating the properties of the homogeneity of concrete:

- For ready-mix concrete
- the average value of the concrete strength of the concrete mixture sample;
- for prefabricated constructions - the average value of the concrete strength of the concrete mixture sample or the average value of the concrete strength of one part of the structure or the average value of the concrete strength of one structure;
- for monolithic constructions - the average value of the concrete strength of the construction site or one construction.

According to GOST 18105-2010, the following symbols are adopted for the above indicators:

V_{norm} is the design class of concrete strength, MPa;

V_f is the actual class of concrete strength, MPa;

R_j, $R_{i\ min}$, $R_{i\ max}$ - single, minimum and maximum values of concrete strength in the batch, MPa;

Rm is the actual average strength of concrete in a separate batch, MPa;

R_T is the required average strength of ready-mix concrete or construction in the controlled batch or controlled period, MPa;

S_m - standard (root mean square) deviation of concrete strength in the controlled batch, MPa;
$S_{n.m}$ - standard deviation of concrete strength in the controlled batch according to the results of non-destructive testing methods, MPa;
S_T is the calculated standard deviation of the used caliber dependence, MPa; C t.n.m - the standard deviation of the constructed caliber dependence, MPa;
$S_{t.P.m}$ is the standard deviation of the destructive or direct non-destructive methods used to construct the calibration curve, MPa;
V_m is the current coefficient of change of concrete strength in the batch, %;
V_m is the average coefficient of concrete strength change for the analyzed period, %; ta - coefficient for calculating Kt and Vf,
V_c is the displacement coefficient of concrete strength change for the analyzed period, %;
Wm is the strength range of concrete in the batch, MPa;
n is the number of unique values of concrete strength in the batch;
α - the coefficient of calculation of Sm.

Conclusion:

In the project process, it is necessary to pay special attention to external loads and the physical and mechanical properties of ground soil, used reinforcement and concrete (nN; nRo ; nRb; nRs), and strictly control their deviation from the project during the construction and installation process. 30 concrete samples of the same brand are tested in a row to determine the coefficient of variation of concrete strength. Thus, the coefficient of one party is determined. A certain number of such parties are studied during a certain time, and then the average indicator is calculated based on the coefficients of all studied parties.

Usually, the period for determining the coefficient of variation of a certain brand of concrete and the strength of the classification of concrete is from 1 to 8 weeks. This indicator is an important criterion for determining the quality of concrete and the reliability of its production technologies. The lower this indicator is, the more stable and reliable the concrete production technology is, and on this basis, the brand of concrete is chosen for the foundation of the house. I must say that the required strength of concrete is not achieved immediately, its full strength is achieved after 28 days of hardening. The strongest hardening is achieved in the first 5-7 days after pouring. During this time, 70 percent of the strength of concrete is achieved, so it is very important to know the strength table of concrete. Concrete is used in construction, which means that millions of people's lives depend on its strength and reliability every day. This fact forces the state to adopt special requirements for the quality standards of such products, so that developers can correctly calculate the load of their buildings. Because concrete is essentially made of components, and even if it is mixed unevenly, the finished product does not meet the specified standards. Therefore, the coefficient of variation of concrete is introduced. The coefficient of variation of concrete is measured as a percentage and indicates how the actual properties of a particular batch may differ from those determined. To determine such a coefficient, usually 25-30 officially produced batches of concrete from the same components and in the same ratio are compared. Usually, a ratio of up to 33% is considered normal.

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