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DETERMINATION OF THE ISSUE STRENGTH CHARACTERISTICS OF CONCRETE STRUCTURES IN SURVEY RECONSTRUCTED BUILDINGS

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At the moment the reconstruction is one of the priority areas in the construction. With reconstruction manage to solve many issues that arise in the real estate and land shortage. Occasionally, to obtain the required area, there is need for new construction. Suffice it during the reconstruction to add floor or make an addition. Reconstruction is also necessary if, without changing the appearance of the building, we have to completely change the interior layout. There are other methods to increase the usable area, connected with reconstruction.

An important step in the reconstruction of buildings and structures is to determine the strength characteristics of reinforcement and concrete in structures. This step is an integral part in surveys of buildings and structures, the reconstruction of residential buildings, changing the industrial facility functionality. Evaluation of the bearing capacity of reinforced concrete structures in the survey of buildings and structures to determine the possibility of future use of the structure, its reliability and durability.

The basic method of determining the strength of the concrete is a test of samples (cores, cylinders) in compression. However, the reliability of such tests is influenced by many factors. These factors include the difference in size cores respect diameter to length, sample humidity, and the factors associated with the sampling portion, a design change relating to the preparation and laying of concrete technology and storage conditions at selected sites. Standard methods do not allow to determine the strength of the concrete in construction sites or, as in the survey of buildings and structures of these methods in specific structures and does not apply.

Consequently, although the strength of the cube and accepted as the benchmark of strength, it can be considered as a conditional response. To assess the strength of existing designs must take into account operating conditions data structures, their shape and dimensions.

Since the beginning of the 90s of the twentieth century is an active development and production of nondestructive testing instruments. With the passage of time there are more and more sophisticated instruments with electronics and microprocessor technology, developing and increasing their functionalities. However, during the determination of concrete strength using nondestructive inspection techniques must be borne in mind that all of these methods are indirect. Compliance with the test results of non-destructive methods of control values of strength of samples tested by conventional methods is achieved by the selection of calibration curves under certain test conditions. It should also be noted that the indirect parameters of non-destructive testing methods to varying degrees affected by changes in the physical and mechanical properties of a controlled concrete. Thus estimation of strength nondestructive methods depends not only on the strength of the concrete, but also on other factors: the modulus of elasticity of the structural concrete inhomogeneity category concrete surface, cement type cement composition, type of filler, hardening conditions, age of the concrete, humidity and the surface temperature, carbonation of the surface layer of concrete and a number of other less significant factors.

Also on the accuracy of the figures obtained by non-destructive methods of control, impact test method. There are several non-destructive methods of concrete strength:

- the method of separation with shear fracture;
- ultrasonic method;
- shock pulse method;
- the method of elastic rebound;
- plastic deformation method.

At the present time the territory of RepublicBelarus there are standards for the individual test methods GOST 17624-2012 and GOST 22690-88.

Non-destructive testing of concrete strength is produced, as a rule, high-performance devices after establishing correlation of indirect characteristics (basic dependencies) to the actual strength of the test concrete. For these purposes, percussion instruments, based on the methods of shock pulse (rebound, plastic deformation) and ultrasonic meters time (speed) of ultrasonic vibrations in the concrete.

Each of the non-destructive testing methods has its advantages and disadvantages. The use of a particular method is primarily determined by the required degree of accuracy readings, the technological capabilities of the application of one of the methods, material costs.

The only non-invasive method of monitoring resistance, for which there are calibration according to the regulations, is the method of separation with shear fracture. This method has a high accuracy in comparison with other methods of nondestructive testing, however, it should be noted a high volume of work during the test. Also

disadvantage of this method can be considered as inability to use this technique inhigh-density reinforcement and thin-walled constructions. In such cases, application of the method allowed separation steel discs, this method is also characterized by high accuracy and considered to be less time consuming in comparison with the method of separation with shear fracture. Disadvantages of the method is the necessity for bonding discs 3–24 hours prior to the test (depending on the adhesive used).

Shearing edges method is mainly used to control the linear elements (piles, columns, beams, girders, lintels). Unlike the separation methods and separation with shear fracture, it does not require preparatory work. However, when the protective layer is less than 20 mm and a damage protective layer the concrete method can not be used.

The most common method of controlling the strength of concrete is a shock pulse method. Instruments that use this method are characterized by low weight and compact design, and finding a concrete strength of a shock pulse method is a fairly simple procedure. Measurement results are provided in units of measurement of compressive strength. It should be noted that the application of this method can determine the class of the concrete, measure the strength at different angles to the surface of the concrete, moving the accumulated results to a computer.The classic model for testing devices according to this method is sclerometer Schmidt and his many counterparts. Rebound method, as well as plastic deformation methods based on the measurement of the surface hardness of the concrete. Rebound method is borrowed from the practice of determining the hardness of metal structures. For concrete testing devices are used, which are called sclerometry and are spring breakers with spherical stamps.

Plastic deformation method is based on measuring the size of the print, which remained on the concrete surface after the stress of her steel ball. Method outdated, but used so far due to the low cost of the equipment. More commonly used for such tests Kashkarova hammer. The operating principle is simple. The hammer is inserted a metal rod known strength, and then the device makes a blow to the concrete surface. With angular scale measure the size of prints left on the concrete surface and the rod. Concrete strength is determined from the ratio of print sizes (rod strength is known). Instruments used for the test method of plastic deformation, based on the indentation of the die in the concrete surface through impact or static pressure given force. Despite the relative ease and low cost of the application of this technique is limited to the degree of accuracy of the values is very high accuracy using this method of nondestructive testing of concrete strength, which suggests a lack of reliability of the results, and, as a consequence, inability to use this technique for critical buildings and structures.

The ultrasonic method is based on recording the speed of the ultrasonic waves. By testing technique emit ultrasound through ensounding (sensors have different angles with the test sample) and the surface ensounding (when sensors are located on one side). Sounding through ultrasonic method makes it possible, in contrast to other methods of nondestructive testing of strength, durability check not only in the surface layers of concrete, but also the structural strength of the concrete body. Ultrasonic devices are used not only to test the strength of the concrete, but also for inspection, quality control of concrete, the depth measurement.

The ultrasonic method makes it possible to carry out mass testing of products of any shape repeatedly conduct continuous monitoring of increase or decrease in strength. The disadvantage of this method is error during the transition from acoustic performance to the resistance. Also, ultrasonic devices can not be used for the quality control of high strength concrete, thoserange controlled strengths limited to 10 ... 40 MPa.

Control strength shock and ultrasonic methods carried out in the surface layers of concrete (except through ultrasonic sounding), and therefore the state of the surface layer has a significant effect on the control results.When exposed to concrete aggressive environments (chemical, thermal or atmospheric) it is necessary to identify the thickness of the surface layer with a modified structure. Also effect on the readings has experience performing the tests, we can not eliminate the human factor in assessing the reliability of the values obtained.

However, it should be noted that the strength of concrete is not the only factor affecting the strength and durability of the entire construction. Concrete should be regarded as a material with oscillating characteristics at random. To achieve the same concrete class may be used many different variations of the compositions of the concrete mix. Thus having a structure the same concrete class may vary in their structure.This involves the use of various technological approaches and material science. It includes the use of various grades of cement, different contents of mineral additives in cement, variations brands of concrete on workability, water-cement ratio, which changes are associated with different activity of cement, as well as with various modifiers the main factors affecting the concrete structure of the stone.Thus, within the same strength of available designs with different structures, increased water cement ratio increases the porosity and therefore the permeability, while the use of modifying agents allows to obtain concrete predetermined plasticity mixture with decreasing amount of water used, which leads to a denser structure of concrete blocks. With regard to the technological aspects, methods are important concrete mix compaction and curing conditions.

Based on the above it is a question from which concrete parameters is a start in determining the strength, reliability and durability of the entire structure. Structural features of the concrete can be taken as a basis for clarifying this issue. The heterogeneity of the structure and properties requires the use of a concrete assessment

of probabilistic and statistical methods, and should be taken into account in the design and organization of production of concrete and reinforced concrete structures.It is necessary to pay attention to the influence of non-homogeneous concrete structure on indirect indicators. A more detailed study of the question of choosing the most appropriate methods of control, as well as the study of the need to treat the surface of the test designs just before the tests.

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