UDC 691.322.7

FIBER CONCRETE IS A MODERN BUILDING MATERIAL

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The article deals with a modern building material - fiber-reinforced concrete. Different types of fibers and their influence on the characteristics of the resulting concrete are described. The technology of creation is considered and its distinctive features are described. The list of possible directions of use of fiber-reinforced concrete is given.

The field of construction in our time is developing quite rapidly and more and more new, unique building materials appear. One of which is fiber-reinforced concrete (fig. 1).

Fig. 1. – Fiber concrete

A distinctive feature of fiber-reinforced concrete is the content of dispersed fibers or fiber in the structure, which gives the material high strength [1].

Fiber in its composition is presented in two variations:

The first type is steel wire. For this type of fiber, the fibers are represented by pieces of wire with a length of up to 50 mm, wave or straight shape. The manufacturing technology depends on the required wire diameter (electrical or mechanical). Fiber-reinforced concrete using steel fiber has extremely high strength and wear resistance. The high weight and tendency to corrosion of this material are its significant disadvantages.

The second type is synthetic fiber. In turn, synthetic fiber, depending on the required characteristics, is made from various materials: fiberglass, basalt, carbon, cellulose and polypropylene.

Fiberglass fibers are made from inorganic glass by melting and pulling the glass mass. The properties of such fiber-reinforced concrete vary depending on the length, thickness and strength of the fibers. Fiber concrete, using this type of fiber, turns out to be quite plastic. Among the minuses, one can single out instability to an alkaline environment.

Basalt fiber is produced by melting the basalt mineral. Basalt threads have high strength, are acid and alkali resistant, and also do not burn.

Carbon fiber is produced by high-temperature treatment of carbon. Fiber concrete with carbon fibers is resistant to corrosion and mechanical stress, acids and alkalis, as well as to high temperatures. It is the most resilient among all types of fiber-reinforced concrete. The only limiting factor in its manufacture is its high cost.

Cellulose fiber is resistant to acids, fire and water. The use of these fibers slows down shrinkage and promotes the removal of moisture to the surface from the lower layers of the screed.

Polypropylene fiber is obtained by cutting and twisting a propylene film. Such fiber-reinforced concrete is resistant to chemical attack and shock loads. It has a number of disadvantages, such as instability to high temperatures, as well as to compressive and tensile loads.

A feature of fiber-reinforced concrete is also the method of its manufacture. The bottom line is that fiber is injected into the cement mortar. Specific routes of administration depend on the fiber material. This is followed by the stage of mixing the fiber with the solution. The main part of the production of fiber-reinforced concrete is accurate proportioning and good mixing.

Fiber-reinforced concrete with synthetic fibers requires a special mixing technology. In this case, mixing should be done by spraying a mixture of fiberglass and concrete. If the preparation technology is not followed, the solution will clump and cease to be homogeneous, which will lead to a decrease in the final strength of the concrete.

The main positive properties of fiber-reinforced concrete include the following [2]:

- high strength;
- frost resistance;
- resistance to moisture;
- resistance to chips and cracks;
- resistance to chemical attack.

Fiber concrete with the addition of steel fibers is widely used in the production of high-strength structures. Foundations, bridge decks, bridge piers, bank protection strips, road surfaces, tunnels, platinum and runways. Fiber concrete has also found a place in the decorative design of high-strength facades, roofs, fences, etc.

The study showed that fiber-reinforced concrete is widely used in various fields due to its positive properties. For the manufacture of fiber-reinforced concrete, various fibers can be used, the choice of which determines the further characteristics of the material obtained. In addition, it is required to strictly adhere to the production technology in order to eliminate the inhomogeneity of the solution.

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