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IMPORTANCE OF GLASS FIBERS FOR CONCRETE

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A B S T R A C T	*K E Y W O R D S*
The article presents recommendations for increasing joint resistance by adding glass fibers to the concrete mixture.	glass fiber, seam resistance, strength, corrosion, dispersion reinforcement, metallic fiber.

Introduction

Concrete is the most widely used building material. The price of concrete is much cheaper than other materials. In this case, there is no material equivalent to concrete. That is, it includes materials that are available everywhere (locally). Another advantage is that concrete strength increases from year to year. This feature shows that concrete and reinforced concrete structures are durable for a long time. Concrete has many advantages as well as disadvantages. Concrete is an anisotropic (homogeneous) material, one of its main disadvantages is low tensile strength and the formation of cracks [1-3].

It is known from experience that cracks appear on the surface of thin-shell structures and other structures of buildings and structures. As a result, concrete strength decreases over time and cracks begin to appear[4-5].

The mechanical properties of concrete (strength, crack resistance, etc.) are determined by the structure of fillers and contact layers between them. The formation of contact layers begins when the concrete mixture thickens [6-8].

In the process of compacting the concrete mixture, it is necessary to ensure that the filler grains are maximally close to each other and their surface is completely covered with cement paste. An increase in the cement stone contact layer causes the formation of internal stresses during the crystallization process. As a result, the formation balance of the structure is disturbed. Fatigue occurs in places where the structure of the composition is not fully formed. This condition is quickly manifested on the surface of concrete and is characterized by the formation of microcracks[9-14].

From this point of view, it is recommended to disperse reinforcement of concrete on the basis of fibers to increase the crack resistance and other properties of concrete. Such fibers act as macroreinforcement for the cement matrix and form a whole skeleton by connecting the constituents of the micromatrix. That is, the stretching created in the structure absorbs the stresses and prevents the concrete matrix from cracking.

One of the fibrous materials used for macroreinforcement of concrete and cement stone matrix is glass fibers. Their average diameter is 0.1...0.5 mm, length is 5...20 mm, and they are resistant to alkaline environment. The tensile strength is very high (2000...4000 MPa), the average density is 40...50 kg/m^3.

High physical and mechanical properties of glass fibers expand its field of application. Because the fibrous structure tends to form a strong framework. As a result of the joint operation of the material matrix and glass fibers, the shortcomings of the material are compensated by the positive properties of the fibers. When the concrete mixture is reinforced with glass fibers, its plasticity is improved, volume penetration, and the appearance of cracks are sharply reduced (compared to metal fibers). At the same time, it prevents the formation of cracks due to the adhesion of fibers while the concrete is in a plastic state.

The difference between fiberglass and metal fibers is that fiberglass does not corrode in concrete. In terms of size, a metal fiber with a diameter of 1 mm corresponds to several hundred glass fibers, and their surface is 10...15 times more than the surface of a metal fiber. The relative weight is much less than that of metal. Therefore, glass fibers are used in concrete 4...5 times less than metal fibers. Glass fibers have high adhesion to cement stone matrix in concrete. Therefore, additional changes to their surface are not required. The coefficients of thermal expansion of cement stone and glass fibers are close to each other. Therefore, high efficiency is achieved when fiberglass concrete is used in constructions that are constantly exposed to the external environment[4].

Such constructions are characterized by resistance to stresses (static, dynamic, etc.), resistance to temperature differences, and resistance to alkaline effects. Structures reinforced with glass fibers have properties such as tensile strength, seam resistance, erosion resistance, and cold resistance [5].

This article provides general information about the mechanical properties of fiberglass-dispersed reinforced concrete, its advantages and applications. In recent decades, many developments have been made in concrete technology. One of the most important achievements is fiber reinforced concrete. Glass fibers occupy an important place among various fibers in the dispersion reinforcement of concrete. The use of glass fibers in concrete and reinforced concrete structures increases the compressive, tensile and bending strengths of concrete. Therefore, determining the optimal amount of glass fibers for concrete is one of the urgent tasks today.

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