

Reinforcement of concrete with fibroconcrete

Pulatova Zukhra Umetovna,

Doctoral student.,

Samarkand State Institute of Architecture and Construction named after Mirzo Ulugbek

Abstract: *The use of fiber concrete reduces the total cost of construction work. The thickness of the concrete layer can be reduced to half the layer compared to conventional concrete.*

Keywords: *fiber, fiber, reinforcement, superplasticizers.*

New technologies reinforcement with continuous fibrous reinforcement changes the behavior of artificial stone, giving it increased resistance to cracking, reducing shrinkage deformation, creating the necessary margin of safety, maintaining the integrity of the structure even after the appearance of through cracks.

Fiber provides three-dimensional hardening of concrete compared to traditional reinforcement, which provides only two-dimensional hardening.

The use of fiber concrete reduces the total cost of construction work. The thickness of the concrete layer can be reduced to half the layer compared to conventional concrete.

The construction time is reduced by half, due to the lack of need for metal reinforcement of concrete floors, installation of a shelf grid.

The principle of operation of fiber concrete. Non-reinforced concrete has low tensile strength and ductility compared to compressive strength. These negative properties of concrete can be improved by combining reinforcement with the addition of fibers. Steel fittings and prestressed fittings are located in structures only in a certain direction. And the fibers are distributed evenly in the concrete and have no influence from the directions.

Table №1



Material	Density	Elastic modulus E, N/mm ²	Tensile strength, N/mm ²	Tensile strength at break, %	Alkali resistance	Melting point
Polypropylene	0,9	3000-15000	300-700	5-15	Отличное	150
For comparison:						
Concrete	2,2-2,4	30000-40000	1-4	0,02	-	-

To obtain a high-quality fiber cement composition, modification of the composition of concrete is required. Mixing of the concrete mixture is carried out in mechanical mixers until uniformity is achieved. The mixing time is calculated from the moment the mixer receives the calculated volume of the last component of the mixture, the mixer must not be loaded above the calculated volume. Chemical additives must be introduced during the mixing process, with the exception of superplasticizers and water-reducing additives, which can be introduced at the end of mixing. After their introduction, the concrete mixture is mixed again so that the additive is evenly distributed throughout the entire volume of the mixture and its effect is manifested in full force. When choosing fibers, their compressive and tensile strengths are taken into account.

Fibroblast in the composition of fibroblast takes from 1 to 20%. The largest number of fibers contains fiberglass – up to 25%. Fiber is added to the concrete mixer with concrete, evenly poured out so that lumps do not form. Fiber improves the quality of the mixture, accelerates solidification.

Advantages of adding fibers to cement mortar:

- gives strength, plasticity;
- protection against moisture penetration by reducing pores in concrete;
- there is no shrinkage;
- the concrete solidification period is reduced.

Preparation of high-quality concrete mortar with fiber:

1. Mix the dry components well together: 3 parts of sand, one part of cement. Add half the volume of fiber. Mix all the ingredients.

2. Add 400-500 ml of water per 1 kg of cement.

3. Add the remaining fiber in small parts and mix thoroughly.

The solution should have a homogeneous consistency, like thick sour cream.

We choose the brand of cement according to the classification, in the table:

Concrete grade	Application	Cement consumption in kg per 1 cubic meter of concrete
M 100	The smallest strength, used for concreting curbs, fences	165
M 200	It is used in the installation of screeds, foundations	240
M 300	It has high strength, is used for the installation of foundations, floors, etc.	320
M 400	It has the highest strength, withstands the load-bearing bridges and overpasses	417

The amount of fibers added to the cement mortar depends on the screed requirements.

№	Fiber consumption	Characteristics of the screed
1	300 g per cubic meter	Slightly increases the binding function and makes it easier to work with the material. This proportion works as an additive that slightly improves the quality of the screed.
2	600 g per cubic meter	Plasticity, resistance to moisture penetration, durability and service life of the coating will significantly increase.
3	800 to 1500 g per cubic meter	Maximum efficiency is achieved.

The minimum consumption should be at least 300 gr. per cubic meter. The ratio of the number of fibers per a certain volume of cement is indicated on the packaging or in the instructions for the fiber for screed.

If you add too many fibers, they can provoke the formation of cracks and splits of the screed.

The use of fiber leads to the fact that concrete becomes more resistant to stretching, its shrinkage rate decreases, which increases crack resistance. At the same time, the resistance of the material to

environmental influences increases: to alternating cycles of freezing and thawing, drying and humidification.

The most important factors are the elasticity and length of the fibers: the greater the elastic modulus of the polymer corresponds to a similar indicator of the cement matrix, and the longer the fibers used, the greater the effect of dispersion reinforcement on the crack resistance characteristics of concrete.

With such a reinforcing material, you will never have any problems associated with a concrete screed at home or at work!

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