UDC 631.1.001

Strength and deformability ELEMENTS reinforced microcrystalline and basalt Fiber

MO Davydenko, Ph.D.

In the article the results of experimental studies of strength and deformability fiber concretes beams of 40×40×160 mm, reinforced fiber and fiber concretes microcrystalline wall rings Ø1000 mmReinforced basalt fiber.

Strength, element, reinforcement, basalt, fiber.

Problem. Use microcrystalline fiber in the manufacture of fiber-reinforced concrete cylindrical container (Ø840 mm height 1200 mm, Internal volume 340 l) Can in order to increase the resistance to various external factors, allowing them to be used for temporary and permanent storage of toxic and radioactive waste, maintaining sufficient strength and corrosion resistance for at least 300 years.

Analysis of recent research. Application bazaltobetona effective in making wall rings, road plates, fireproof structures, floors, with internal reinforcing tunnels and others. [1, 2].

The purpose of research. To prove the technology of manufacturing building elements, reinforced microcrystalline and basalt fiber.

Results. Below are the results fksperymentalnyh research strength and deformability fiber concretes beams of 40×40×160 mm, reinforced fiber and fiber concretes microcrystalline wall rings Ø1000 mmReinforced basalt fiber.

Microcrystalline stainless fiber has the form of flexible metal fiber length of 30 mm, a width of 12 mm and a thickness of 2040 microns. Fiber has high corrosion resistance and high tensile strength of 1700 MPa. For its production uses non-deficient ferro alloys (Fe, Cr) 80 (P, C, Si) 20, ferrochrome, ferrosilicon, ferrophosphorus. Microcrystalline fiber obtained Kyiv Physical and Technological Institute of Metals and Alloys National Academy of Sciences of Ukraine using nanotechnology. Graduation microcrystalline fiber was adopted: 10, 15, 20, 35, 30 kg / m3

concrete. As basalt fibers used in the fiber brand VBM 40R.12 diameter 40 mm and length 12 mm of JSC "Mineral", produced by TU Article 2.7-26.8 32673353-001: 2007.

Test Beams Series CF-I ... V was performed according to GOST 10180-90 [1] on the test machine Huchstraft (100 kP). Measurement of

strain on the top and bottom faces of the samples was carried out using strain gauges measuring base20 mm and automatic measuring deformations. Test bazaltofibrobetonnyh wall rings running load, conducted according to GOST 6482 [2] using the testing machine FP-15. Measurement of strain in the extreme verge inner tube-capacitors and rings performed using Indication of the point value on the basis of 0,001 mm 200 mm.

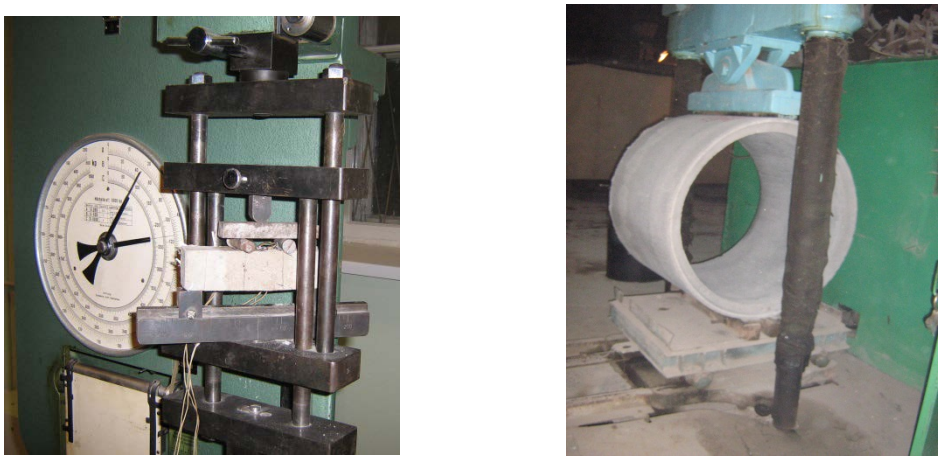

Fig. 1. Test fiber concretes beams reinforced fiber and microcrystalline bazaltofibrobetonnyh wall rings Ø 1000 mm.

The test results of samples girders, reinforced microcrystalline fiber are shown in Table. 1. Increase the strength of beams compared to concrete without fiber samples (series B-I) observed with the number of fibers in the volume of concrete. For concrete class C25 / 30 strength increase amounted to 16%, 7%, 13%, 8% and 36% respectively.

Increase fiber concrete stretched deformation zone compared to concrete without fiber samples was observed in almost all the series of beams Series FB-I, FB-V. For concrete class C25 / 30 - in 6.56 times. According to test results the best indicators of strength and deformability fiber concrete class C25 / 30 samples showed the number of fibers 15 kg / m3 - 30 kg / m3. The test results of wall rings Ø 1000 mmReinforced with basalt fiber coefficient of variation and the relative errors are shown in Table. 2.

1. The test results of average samples girders, reinforced microcrystalline fiber.

Code series	Concrete class	Number fiber, kg / m3	Rmax kN	$\varepsilon_{CF,max}$ X 10-5	$\varepsilon_{cft,max}$ X 10-5	Number of fibers in the fiber cross section (total / in growth. Area)

B-I	C25 / 30	-	2.61	-31	36	- / -
FB-I	C25 / 30	10	3.03	-48	125	20/12
FB-II	C25 / 30	15	2.79	-61	172	43/24
FB-III	C25 / 30	20	2.96	-84	136	62/35
FB-IV	C25 / 30	25	2.83	-94	336	72/42
FB-V	C25 / 30	30	3.55	-68	266	77/49

2. Test results fiber concretes wall rings Ø1000 mm basalt fiber reinforced.

Code series	Rmax, kN / m	ε_{cft} x 10-5
CRS-I	32.08	23.5
CRS-II	34.1	26.1
CRS-III	29.6	22
ν	7.05	8,67
β	4.98	5.48

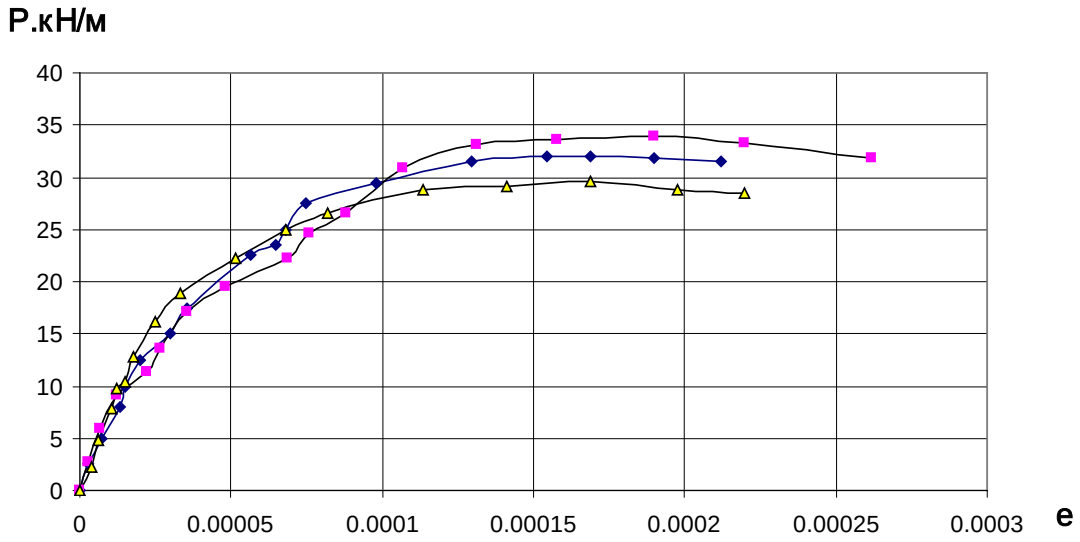

Fig. 2. Test Charts wall rings basalt fiber reinforced.

The value of the maximum load of the ring wall Ø1000 mm reinforced basalt fiber, consistent load crack GOST 6482-88 [2] and slightly higher than the value of the load crack rings Ø1000 mmReinforced steel mesh. According to test results based dependency "load - deformation tension" wall rings basalt fiber reinforced.

Cracks in all subjects bazaltofibrobetonnyh wall rings appeared only in diametric horizontal and vertical sections, according to the relevant diagram points. At the turn after the destruction of the ring wall was not scraps fibers pull out of the concrete matrix, indicating a rather high adhesion of basalt fiber cement matrix.

Conclusions

On the basis of studies found that the composition of fiber concrete class C25 / 30, microcrystalline fiber reinforced recommended amount of

fiber around 20-25 kg / m3 to achieve optimal characteristics of strength and deformability.

Based on experimental studies found that for wall rings Ø 1000 mmReinforced concrete basalt fiber matrix required class not less than S32 / 40.

Maximum load when checking the strength of the wall of the Rings meets bazaltofybrobetonu cracking load, the value of which exceeds load cracking wall rings, reinforced with steel mesh.

References

1. Betonы. Methods for determining prochnosty on kontrolnым sample: GOST 10180-90. - [Intr. s 01/01/91]. - M .: Izd standartov, 1990. - 30 p.
2. Pipes zhelezobetonnые beznapornые. Tehnycheskye conditions: GOST 6482-88. - [Intr. s 01/01/90]. - M .: Izd standartov, 1989. - 75 p.

In Article pryvedenы Results of research эksperymentalnыh prochnosty and deformability of beams fybrobetonnыh Size 40×40×160 mm armyrovannыh mykrokrystallycheskoy fybroy and fybrobetonnыh stenovyh kolets Ø 1000 mm, armyrovannыh bazaltovoy fybroy.

Prochnost, element, armyrovanyya, basalt, Fibro.

This paper presented experimental results of strength and deformability fiber concretes beam size 40×40×160 mm, reinforced fiber and fiber concretes microcrystalline wall rings Ø 1000 mm, reinforced with basalt fiber.

Strength, element, reinforcement, basalt, fiber.