



PROSPECTS FOR THE USE OF ASBESTOS CEMENT WASTE AS MICROFIBER IN THE MANUFACTURE OF AERATED CONCRETE

¹Bahodirov Azizbek Abdulazizovich, ²Abdusamatov Kamol Begalievich
Professor doctor of technical sciences¹, Senior teacher, Jizzakh Polytechnic Institute²

ANNOTATION

The article describes experimental tests for the strength of fiber concrete samples made on the basis of local raw materials using asbestos-cement waste as fiber.

Key words: *asbestos, asbestos cement, fiber, fibrogas concrete, industrial waste, strength.*

INTRODUCTION

In the construction of modern multi-storey residential and industrial buildings, the use of durable and high-quality building materials takes into account their durability and energy efficiency.

The issue of maintaining heat in the rooms in winter and cool conditions in summer has long been implemented differently. Now the use of lightweight and ultra-lightweight concrete is expanding.

The practice of adding different fibers to building materials has historical roots, for example, horse manure or straw has been used to increase the strength of bricks. In 1911, Porter discovered that fibers could be used in concrete to improve its strength properties. [3; 4] Fibroconcrete is concrete that is evenly distributed (dispersed) in the natural stone volume of the micro-reinforcement (fibers). [10] The effectiveness of the dispersed strength of concrete depends primarily on the ratio of the strength and deformation properties of the inter-porous membranes of the concrete matrix and the reinforcing fibers (fibra). The strength of concrete can be achieved by adding different fibers to its composition. [4; 5; 7; 8; 9; 12; 13]

Today, enterprises produce concrete products by adding various fibers. These fibers include steel fiber, metal fiber, polypropylene fiber, basalt fiber, glass fiber, and other fibrous fibers. [4; 10]. Asbestos cement, an industrial waste, can also be used as a fiber to improve the properties of concrete products.

MAIN PART

In the early 1900s, asbestos fiber was first used as a fiber. In 1963, Romualdi and Betson published their classic work on FRC (Fiber-reinforced concrete). [3; 4] In Russia in the early 20th century, work to increase the strength of concrete with commercial concrete and mixed disperse additives was carried out by Russian engineer VP Nekrasov. Further development of this work continued in the middle of the last century in the Soviet Union. [4; 9; 10] Since 1980, the building code 277-80 (SN 277-80 "Instructions on the manufacture of cellular concrete" SN 277-80) recommended the use of asbestos grades 5 and 6 as a fibrous additive.

Currently, a lot of attention is paid to the disposal of asbestos-cement waste, which is primarily due to the lack of raw materials almost everywhere and their rising prices. At the same time, asbestos cement waste contains compounds that are suitable for obtaining building materials for various purposes. The problem of asbestos-cement waste disposal (ATCC) is also relevant because its solution reduces environmental pollution.

All asbestos cement products generate two types of waste: dry and wet. Dry waste consists of scrap products, pieces of asbestos-cement products, sheets from sheet cutting, shavings, as well as scraps and dust

from cutting and polishing of asbestos-cement products trapped in cyclones and filters. The volume of wet waste, which is the sediment of wastewater, reaches 1.5-2% of the mass of raw material on dry matter.

Table-1
Properties of asbestos cement wastes

Type of asbestos cement waste	компонентлар таркиби, %								
	п.п.п.	SiO ₂	Fe ₂ O ₃	Al ₂ O ₃	Сумма CaO	CaO _{св}	MgO	SO ₃	RO ₂
Wet waste, based on portland cement									
min.	19,4	14,5	2,8	2,4	32,4	0,1	1,4	0,3	0,5
max.	29,6	24,6	8,8	7	47,2	5,5	8,6	6,5	1,1
average	25,6	18,7	3,5	4	41	2,94	4,2	2,9	0,8
Dry waste, based on portland cement									
min.	11,2	18,9	3,2	2,9	44,1	4,6	4	0,5	0,3
max.	20,6	21,4	5	5,3	52,4	6,6	5,4	2	0,7
average	15,6	20	4,2	3,9	49	5,6	6,2	1,3	0,6
Sawdust from the pipe shell	17,3	20	3,6	2,9	47,2	-	4,7	1,4	0,6
List fragments	14,8	20,1	4,2	4,1	50,1	5,5	6,2	1,3	0,5



Figure 1. Asbestos cement.

In the laboratory of the Department of "Building Materials and Structures" of Jizzakh Polytechnic Institute, experimental work is being carried out on the preparation of samples of aerated concrete using asbestos-cement waste as fiber.



Figure 2. Fibrogazobeton samples prepared for testing

Asbestos-cement waste from Nurafshon Obod Qurilish LLC, which produces fiber slate in Jizzakh, was used for experimental samples. It was determined under laboratory conditions that the bulk density of this waste was 345 kg / m³.

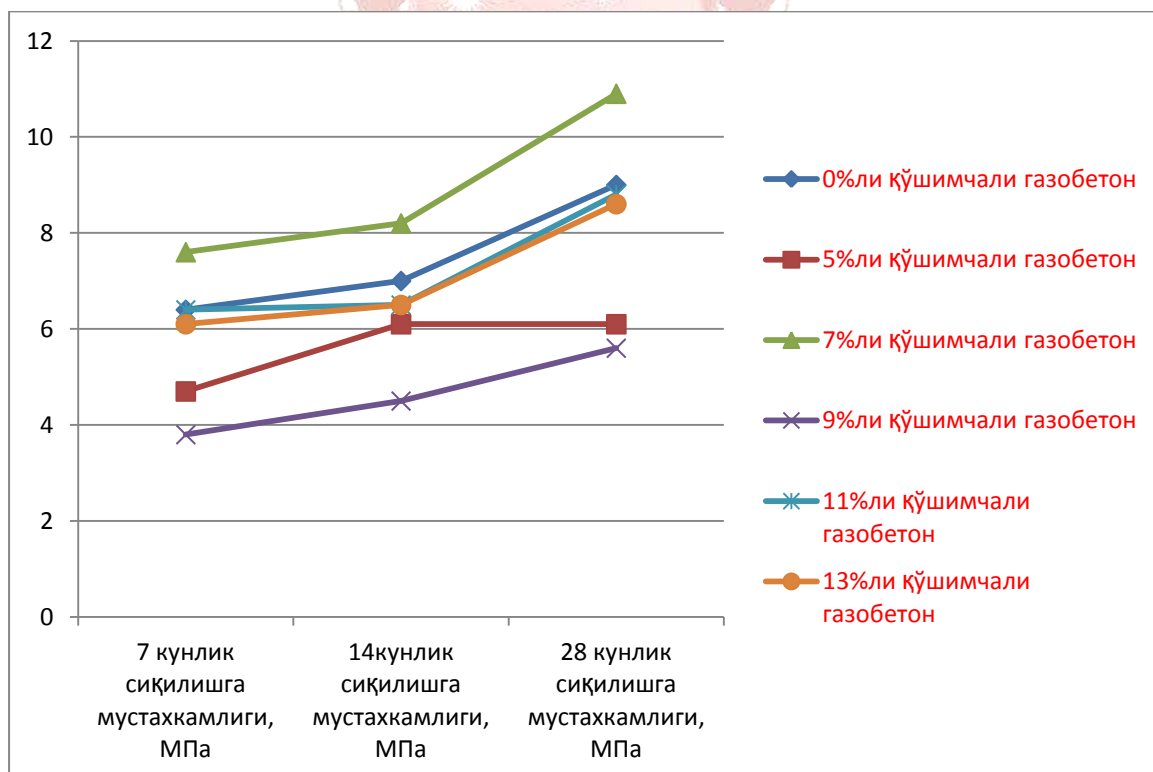


Figure 3. Microscopic view of the asbestos fiber in the waste.

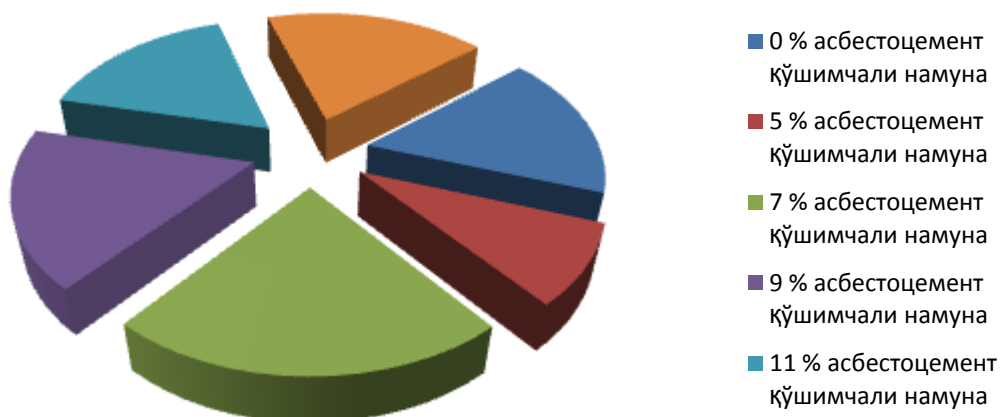
The dimensions of the asbestos fibers in the added asbestos cement waste for the samples tested in the experiment were examined using an Altami MED 5T microscope. The size of asbestos fibers in this microscope, which can magnify substances up to 2,000 times; that is, the length was found to be in the range of 13.6416 - 63.77 microns, and the fiber thickness was found to be in the range of 3.00096-20.1861 microns.

Cement for aerated concrete prepared for the experiment was used TsEM II / A-I 32.5N brand products of Zafarabad cement plant of Almalyk TMK, prepared in accordance with GOST 31108-2003. As a filler, 5 micron calcite sand from Bakhmal district of Jizzakh region was used.

This diagram shows the results obtained when testing fibrogazobeton samples. [11]



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Based on the results of the experiments, we can conclude that the production of fibro-aerated concrete by adding fiber to aerated concrete has shown its effectiveness. Experiments have shown that the strength of fibro-aerated concrete compared to ordinary aerated concrete increases depending on the type of aggregate, the amount of fiber and the bulk mass (brand). That is, the results of the experiment showed that the optimal amount of asbestos cement to be added to the aerated concrete was 7%. The addition of asbestos-cement fiber in this percentage increased the flexural strength of the sample by 33% and the compressive strength by 21%.

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