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INFLUENCE OF THE TEMPERATURE AND HUMIDITY REGIME ON THE WATER ABSORPTION OF LIGHT-WEIGHT CONCRETE ON POROUS AGGREGATES

Rizaev Bahodir
Professor of Namangan Civil Engineering Institute
Akhmedov Islombek
Associate Professor of Namangan Civil Engineering Institute
Khamidov Adhamjon
Professor of Namangan Civil Engineering Institute
Kholmirzaev Sattor
Professor of Namangan Civil Engineering Institute
Jalolov Zayniddin
Lecturer at Namangan Civil Engineering Institute
Umarov Isroiljon
Lecturer at Namangan Civil Engineering Institute

Abstract: *This article is devoted to a theoretical and experimental study of changes in the temperature and humidity conditions in lightweight concrete on porous aggregates on the water absorption of concrete*

The data obtained indicate that with an increase in bulk density and with the use of ordinary sand as a fine aggregate, the water absorption of concrete on the studied porous aggregates decreases.

Key words: *temperature and humidity regime, microcracks, destructive process, concrete durability, alternate moistening and drying, softening coefficient, water absorption of concrete Keywords: temperature and humidity regime, microcracks, destructive process, concrete durability, alternate moistening and drying, softening coefficient, water absorption concrete*

Research by N.A. Popov, V.V. Nevsky. and other authors have shown that with multiple changes in the temperature and humidity conditions in lightweight concrete, microcracks and cavities are observed on porous aggregates. These defects affect the durability of concrete, as they lead to a decrease in its strength, and with the further development of this destructive process, to the destruction of concrete. [1,2]

The considered concrete durability factor was determined after 50-fold alternating wetting and drying. Samples 100 100 100 mm in size were placed for 12 hours in a bath with water at a temperature of 18-200C, after which they were alternately dried and moistened. Control cubes were stored prior to testing under normal curing

conditions at the above temperature. The results of tests of cube samples after alternate moistening and drying, as well as the softening coefficient determined during these tests, are shown in table 1.

Strength values and coefficient of softening of concrete after testing.

Tab 1

Conditional Concrete strength designations, MPa	Sample strengths in compression, MPa		Loss of strength %	Softening factor
	control	after 50 cycles		
7,5	7,7	7,4	2,6	0,84
10,0	10,7	10,3	3,4	0,81
15,0	14,6	14,5	0,4	0,85
20,0	19,8	19,8	Нет	0,90
30,0	30,5	30,4	0,4	0,85

The given data indicate that the concretes on the studied porous aggregates are sufficiently resistant to repeated changes in the temperature and humidity conditions, which is an important factor in durability when deciding whether these lightweight concretes can be used in products and structures. [3]

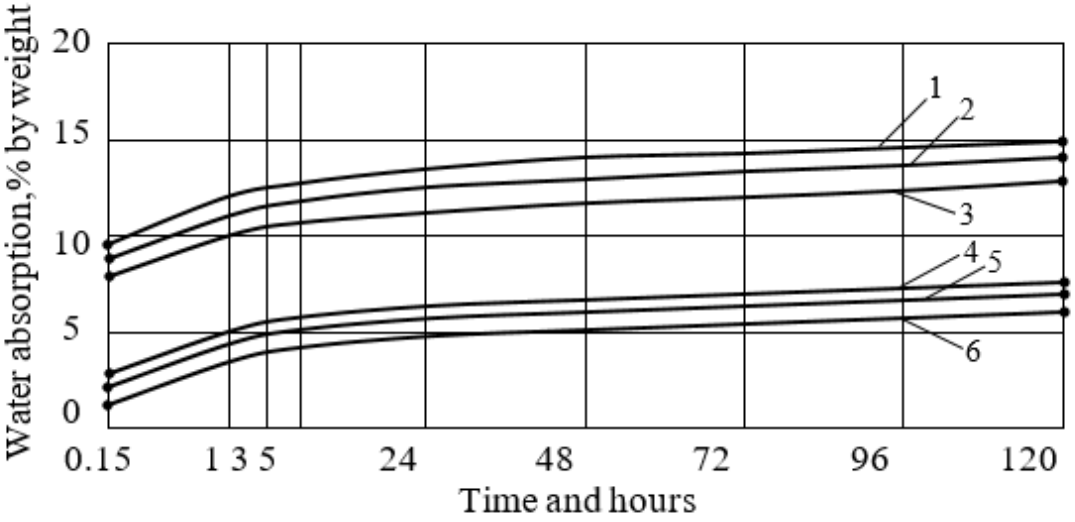
The water absorption of concrete on the studied porous aggregates was determined on samples dried to a constant density, then the cube samples were placed in a water bath at a temperature of 180C 20C. Cube samples were weighed after 1,3,5,24,48,72,96 and 120 hours.

Figure 1 shows the dependence of the water absorption of lightweight concrete on the studied porous aggregates on the time of storage of the cube samples in water and the type of aggregate, it can be seen that concretes are characterized by intense water absorption in the first hours, which ranges from 42 to 60% by weight of the total water absorption. It should be noted that in the first hours, the water absorption of lightweight concrete on porous fine aggregate (concrete strengths 7.5 MPa, 10.0 MPa, 15.0 MPa) is greater than on lightweight concrete using ordinary sand as fine aggregate (strengths 20.0 MPa and 30, 0 MPa). This is probably explained by the fact that fine porous aggregate forms more micro and macro capillaries in the concrete structure, which contribute to more intense water saturation in the initial period. [4]

In the future (when stored for 1-3 hours or more), the intensity of water absorption decreases and remains approximately equal for all compositions.

The total water absorption was determined after a month's stay of sample cubes in water and amounted to concrete with a strength of 7.5 MPa, 10.0 MPa, 15.0 MPa,

approximately 16-17%, for concrete with a strength of 20.0 MPa, 30.0 MPa, 13-14%
.



Rice. 1. Dependence of water absorption of concrete on time and type of filler.

1,2,3. - concrete with a strength of 7.5 MPa, 10.0 MPa, 15.0 MPa on fine porous aggregate;

5.6.-concrete with a strength of 20.0 MPa, 30.0 MPa on fine aggregate, sand;

4.-claydite concrete with a strength of 20.0 MPa on quartz sand.

The data obtained indicate that with an increase in bulk density and with the use of ordinary sand as a fine aggregate, the water absorption of concrete on the studied porous aggregates decreases.

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