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INFLUENCE OF TEMPERATURE AND HUMIDITY CONDITIONS ON WATER ABSORPTION OF LIGHT CONCRETES ON GROUND AGGREGATES

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Abstract
This article is devoted to the theoretical and experimental study of the change in the temperature and humidity regime in light concretes on porous aggregates for the water absorption of concrete. The obtained data indicate that with an increase in bulk mass and with the use of ordinary sand as a fine aggregate, the water absorption of concretes on the investigated porous aggregates decreases.

Keywords: temperature-humidity mode, microcracks, destructive process, concrete durability, alternating moistening and drying, softening factor, concrete water absorption.

Studies by N.A. Popov, V.V. Nevsky and other authors have shown that microcracks and cavities are observed in light concretes on porous aggregates at multiple changes in temperature and humidity conditions. 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 and to the destruction of concrete. The concrete durability factor in question was determined after 50 times alternate wetting and drying. Samples measuring 100,100 100 mm were placed for 12 hours in a water bath at 18-200C temperature, after which they were alternately dried and humidified. Control cubes were stored prior to the normal hardening test at the above temperature. The results of the tests of the cube samples after alternate humidification and drying, as well as the softening factor determined during these tests, are given in Table 1.
Strength values and softening factor of concrete after testing.

Table 1

Conditional Concrete strength designations, MPa	Strength of samples at 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 above concretes on the investigated porous aggregates are of sufficient strength with multiple changes in temperature and humidity conditions, which is an important factor of

durability when deciding on the possibility of using these light concretes in products and structures.

The water absorption of concrete on the investigated porous aggregates was determined on samples dried to constant density, then the cube samples were placed in a bath with water at a temperature of 180C 20C. The cube samples were weighed after 1.3.5.24.48.72.96 and 120 hours.

In Figure 1. the dependence of water absorption of light concrete on the investigated porous fillers on the time of storage of cube samples in water and the type of filler is shown that concrete is characterized by intensive water absorption in the first hours, which is from 42 to 60% by weight of total water absorption. It should be noted that in the first hours the water absorption of light concrete on porous fine aggregate (concrete strength of 7.5 Mpa, 10.0 Mpa, 15.0 Mpa) is more than on light concrete using ordinary sand as fine aggregate (strength of 20.0 Mpa and 30.0 Mpa). This is probably due to the fact that the small porous aggregate forms more micro and macro capillaries in the concrete structure, contributing to more intensive water injection in the initial period.

The total water absorption was determined after a month's stay of the cube samples in water and was made for 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%.

20,0Мпа, 30,0Мпа, 13-14%.

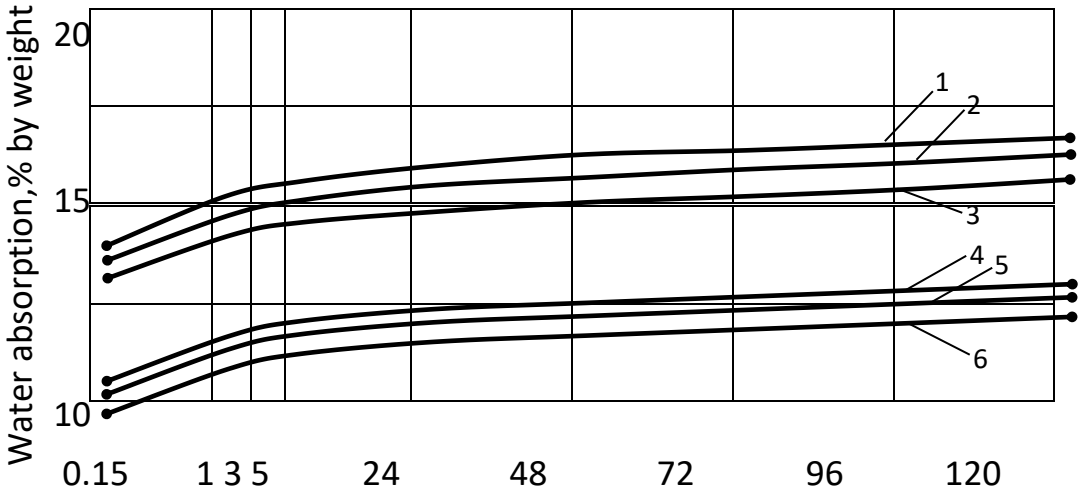

Fig. 1. Dependence of concrete water absorption on time and type of aggregate.

1,2,3.-betons with strength of 7,5Mpa, 10,0Mpa, 15,0Mpa on fine porous aggregate;

5.6.-betons with strength 20.0 MPa, 30.0 MPa on fine aggregate, sand;

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

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

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