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CHANGE RELATIVE DEFORMATION OF NONE-AUTOCLAVE CELLULAR IN CONDITION OF THE CLEAN SHIFT

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Abstract
Results of the studies of none-autoclave cellular are generalised In article with one axis and sprain with removal and without removal of friction, as well as is presented information on nature of the change to relative deformation under central compression and sprain. The Organized results of the studies of none-autoclave cellular at two-axis "sprain-compressions". The Broughted results of the analysis experimental data, on the grounds of which are made corresponding to findings, as well as results of the determination of the change relative deformation of none-autoclave cellular in condition of the clean shift, is revealled that toughness of none-autoclave cellular in two-axis "Compressions-sprains" on 13,5% lower, at sprain on axis of the symmetries.
Keywords: compression, sprain, destruction, toughness, results, voltages, friction, none-autoclave, module to bounce, shift, deformation, resistance, pilot model, analysis, test, experiment, material.

Introduction
Non-autoclaved aerated concrete in construction is mainly used for the production of fencing of structures as a structural and heat-insulating material. The main types of products made from non-autoclaved aerated concrete are as follows: small wall blocks, reinforced and

unreinforced large wall blocks, reinforced wall panels, reinforced roofing and attic floor slabs, thermal insulation boards.

However, despite the existing experience in the production and use of non-autoclave aerated concrete, the area of their application in construction remains limited. One of the reasons preventing widespread use is the lack of the above studies.

Main part

In this regard, NIIZhB carried out complex experimental and theoretical studies of the operation of the based varieties of non-autoclave aerated concrete both under short-term and long-term action of compressive loads as well as under biaxial stress state.

Tests of non-autoclave aerated concrete specimens with dimensions of 15x15x15 cm were carried out 162 days from the date of their manufacture under conditions of a biaxial stress state "compression-tension", equivalent to pure shear

$$G_1=-G_2=\tau_{XY} \quad (1)$$

According to [1, 2, 3], when applying a compression-tension load to the test specimen, with the principal stresses G1 and G2 of equal magnitude and opposite in sign, the inside element with sides located at an angle of 45 ° to the principal axes of the specimen will be to be in pure shear conditions, i.e. only shear stresses will act on the faces of this element τ_{xy}.

The measure of deformations caused by shear stresses is characterized by the shear angle or simply shear strains γ, which is related to the shear modulus G_B and the magnitude of the shear stresses τ_{xy} by the following relation

$$G_B = \tau_{xy}/ \gamma \quad (2)$$

where γ – shear angle, which is defined as double deformations of the elongation of the diagonals of the element, along the edges of which shear stresses act in the zone of elastic work of non-autoclaved aerated concrete. In order to avoid the influence of the presence of shrinkage cracks in the cubes, the shortening deformations were not taken into account.

During testing, tensile and compressive deformations were measured by wire strain gauges with a base of 50 mm, their readings were measured with an AID-IM strain meter. For the purpose of mutual control, the strain gauges were glued symmetrically on opposite faces of the sample, free from loading, and their direction would coincide with the diagonals of the sample element, along the edges of which shear stresses act.

Before testing at biaxial tension-compression, in order to reveal the effect of friction on the strength of uniaxial compression and tension, some of the prototypes were tested on the same setup with friction elimination.

The results of these tests are shown in Table 1 and Fig. 1 a, b. Note: in the table, the ρ values are given in a naturally moist state.

The results of comparing the experimental data obtained under uniaxial compression and tension with elimination of friction with the experimental data obtained under the same loads without elimination of friction (see Ch. 2.4, Table 2.3) show that elimination of friction in the supporting surfaces led to a decrease in strength when compressed by an average of 12%. And the tensile strength, measured with self-centering grips, decreased by 6.5%. The results obtained are consistent with previously obtained experimental data on other types of concrete, in works [4,5,6].

Table 1. Results of tests at uniaxial compression and tension with elimination of friction

Series number (according to table 2.1; 2.2 and 2.3)	Test type	ρ, kg/m^3	R, Мпа	Deformations in the moment extinguishing 10-5
IX	With axial	1191 1124	3,55 0,37	177,5 15,25

Fracture of specimens tested with elimination of friction under axial compression occurs due to longitudinal cracks parallel to the action of compressive force. And with axial tension, their destruction occurs along a plane perpendicular to the action of tensile stresses.

In tests on biaxial "tension-compression" (at pure shear) it was found that the stress reduction is 13.5% lower than at axial tension, i.e. is 0.32 MPa.

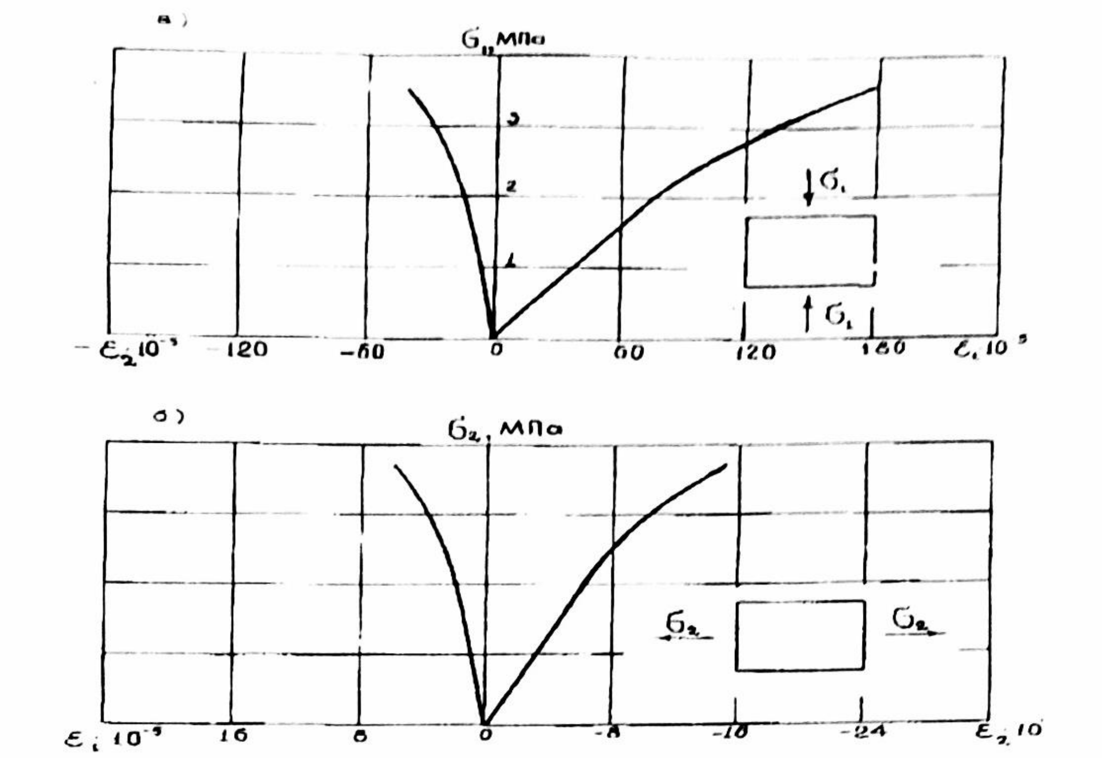

Fig. 1. The nature of the change in the relative deformations of non-autoclaved aerated concrete (on unmilled sand, IX series) during central compression-a and tension-b) (with the elimination of the effect of friction).

Similar results were obtained in [7, 8,]. The results of measuring the relative deformations are shown in Fig. 2. From fig. 2 that the nature of the change in the relative deformations of shortening and elongation is almost the same. However, to calculate the shear modulus by the formula, (2), the elongation deformations were taken into account. It was determined that the values of the shear modulus of non-autoclave aerated concrete is 1200 MPa, which is equal to 0.414 of its initial modulus of elasticity in compression.

Also, according to the test results of 6 prisms with a size of 15x15x60 cm under axial compression without eliminating friction, the shear modulus of non-autoclaved aerated concrete was determined using the well-known formula:

$$G_B=E_B/2(1+\mu) \quad (3)$$

where: E_B=2900 МПа, μ=0,21.

The shear modulus value according to formula (3) is 1198 MPa, i.e.0,413* E_B.

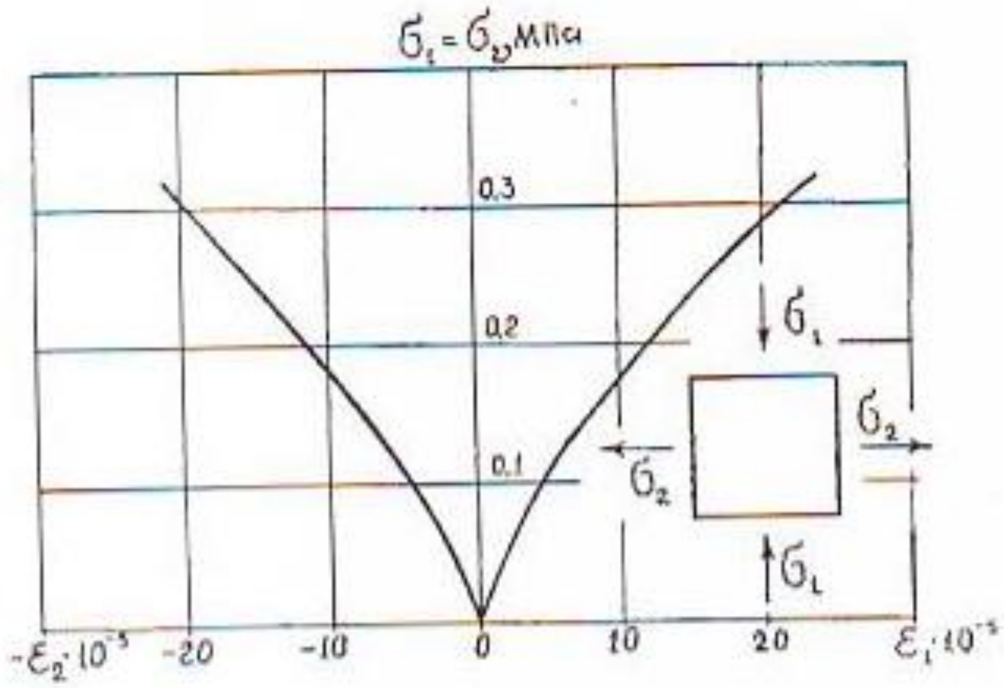

Fig. 2. Changes in the relative deformations of non-autoclaved aerated concrete under pure shear conditions.

Conclusion

1 . Thus, it was experimentally established that the shear modulus of non-autoclaved aerated concrete, established by experiments under pure shear conditions, is 1200 MPa, which is GB = 0.41EB.

2. The strength of non-autoclaved aerated concrete in a biaxial "compression-compression" increases. The largest increase is 20% when the ratio of the main compressive stresses is 0.4-0.6 and with uniform compression this increase is 8-10%.

3. It has been experimentally established that the thickness of non-autoclaved aerated concrete under biaxial compression-tension is 13.5% lower than with axial tension.

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