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INVESTIGATION OF THE STRENGTH AND DEFORMATION CHARACTERISTICS OF EXPANDED CLAY CONCRETE UNDER SINGLE STATIC LOADING

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Lightweight concrete is widely used for outer fencing of heated buildings when it is necessary to reduce the weight of structures. It is also used in agriculture and industrial construction. The concrete is used in hydraulic engineering, for the bulk structures. The use of lightweight concrete in construction reduces weight, cost and complexity of the structure, solves the problems of energy resource saving in construction and maintenance of engineering structures and buildings, as well as increases their durability, reliability and safety in operation, and reduces the load on the basis of foundation.

Important characteristics of strength and deformability of concrete are within the upper and lower microcrack formation.

The definition of the upper limit of microcrack formation was carried out according to the results of tests of samples of prisms by constructing a dependence "the stress – volumetric strain" according to graphically averaged experimental data. The peak point on the curve shows the upper limit of microcrack formation. Upon reaching the upper border of microcrack formation the total length and the number of combined cracks increased their widths.

The definition of the lower microcrack formation was also made graphically from the experimental data. First, the dependence of "the level of load – Poisson's ratio" was drawn based on the experimental data. Poisson's ratio is defined as the ratio of the relative transverse strain to the longitudinal one or as the ratio of longitudinal modulus to transverse deformations for each stage of loading. The lower limit of microcrack formation was determined by taking the second derivative of Poisson's ratio.

The studies identified the cube, prismatic and cylindrical strengths, modules of longitudinal and transverse deformations, shear modulus, and the limits of microcrack formation concrete. The ratio of prism strength was equal to 0.8. The limits of the upper and lower microcrack formation are required for the operational loads. The material will operate elastically up to the limit of the lower microcrack formation and destructive processes do not occur. At the level of loading greater than or equal to the upper limit of microcrack formation an intensive development of cracks take place and the material can break down.