RESEARCH AND ANALYSIS OF THE INFLUENCE OF RECIPE AND TECHNOLOGICAL FACTORS ON THE STRENGTH OF EXPANDED CLAY CONCRETE ON QUARTZ SAND.

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Particular attention in the difficult war and future postwar times is paid to the problem of cheapening public and civilian objects, increasing their level of industrialization, which can only be achieved by improving constructive solutions, the use of effective building materials. The use of light concretes, including expanded clay concretes on cement-ash binder with chemical additives is an urgent task, since it involves saving raw materials, cement, recycling production waste and improving the condition of the environment.

The aim of the work is to study the strength and deformation properties of expanded clay concrete on cement-ash binder and to prove the technical possibility and economic feasibility of its study in structural elements of civil buildings.

The five-factor plan B5 was implemented. In the matrix, each of the technological factors changed at three levels (-1; 0; +1), which made it possible to obtain quadratic mathematical models of output parameters - the bulk mass of concrete, cubic and prismatic strength of the expanded clay concrete at the age of 1 (a.s), 28, 115, 180 and 360 days, when the expanded clay concrete mixture is mobile (the constant draught of the cone is DC= 2...6 cm).

To achieve this objective, it was necessary to:

- to obtain the convenient for the practical study of the dependence of the main properties of clay concrete mixture on the cement-ash binder with the index of mobility OK=2... 6cm and concrete from the main formulation and technological factors;
- to obtain statically convenient dependencies, allowing to predict water consumption of the mixture, volume mass, volume of inter-grain voids, cubic and prism strength.

Research factors on materials used in studies:

X_1 - 180±60 kg/m^3, Portland cement OJSC «SOUTH cement» brand 400;

X_2 -125±25 kg/m^3, ground ungashed lime, Kodyma, activity on CaO - 58%;

X_3 - 150±50 kg/m^3, fly ash Ladygenskaya thermal power plant;

X4- 400±140 kg/m^3, ceramic gravel (Kulindorovsky Zavod from the clay deposit of the Orel region of the Odessa region) fraction 5...10 and 10... 20mm in volume ratio $V_{5...\ 10}/V_{10...\ 20} = 1,5$;

X5- 290±30 kg/m^3, sand river dense "Telman quarry", "Kremenchuk river port", module of size 1,36.

Plasticizer C-3 was introduced as 0.6% of cement mass and gypsum - 25 kg/m^3.

Processing of experimental results to identify regularities of influence of studied factors - consumption: cement (x_1); lime (x_2); fly ash (x_3); expanded clay gravel (x_4); quartz sand (x_5) on water consumption of ceramic and concrete mixtures - B, volume of inter-grain voids V_n, the density of the ceramic concrete mixture – ρ_o and the density of the expanded clay concrete ρ allowed to obtain with 95% reliability quadratic regression equations, taking into account only significant regression coefficients.

Based on the results of experimental studies with 95% reliability quadratic regression equations of cubic and prismatic strength in the age of 1 (a.s), 28, 180* and 360* days are obtained, expanded clay concrete on CLF-binder and quartz sand with only significant regression factors.

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Expanded clay concrete on quartz sand and cement- lime- fly ash binder with a strength of 15, 20, 25 MPa can be recommended as a construction material for the manufacture of concrete and reinforced concrete structures.

Studies of the strength of expanded clay concrete on quartz sand, made on the basis of CLF -binding and determined:

- bulk mass;
- cubic and prism strength and their change in time;
- the value of the prism strength coefficient.

Density ρ, strength R, R_b expanded clay concrete in ages 1(a.s), 28, 180, 360 days is recommended to use simple linear regression equations.