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Influence of Way of Stabilization of Unburned Bricks on Mechanical Physical Properties

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ABSTRACT

Principles of sustainable construction bring new tendencies in the sphere of development of building materials. New materials and constructions are evolved according to new sets of criterions: (1) maximal use of renewable sources, (2) minimization of embodied energy, embodied CO_2, embodied SO_2, (3) maximal use of recycled and recyclable materials. Consequently it is necessary to ensure the same requirements of dependability, efficiency of building and quality and durability of the structures as when using common structures.

Possibilities of using new *unburned clay* constructions in Czech conditions were analysed within the long term research performed at CTU in Prague. The target goal of this reserach is optimization of building structures from the environmental point of view.

The particular goal of the research was to optimize the manufacturing technology of *unburned bricks* by ensuring mechanical physical properties in dry state as well as with consideration of influence of moisture according to following criterions: (1) minimization of working pressure, (2) reduction of admixtures amount to minimize contamination of raw clay (minimization of embodied energy, embodied CO_2, embodied SO_2, easy recycling).

A set of tests in compressive strength and bending tension strength of unburnt bricks has been done within the experimental part of the project. Testing specimens - unburned bricks of the size 297x140x70 mm have been produced aplying 3 values of working pressure (2,0; 4,0; 8,0 N/mm^2) and 3 ways of stabilization by pressure (without admixture, with admixture of lime 5% and with admixture of cement 5%). All together there were produced 9 sets of testing elements. Amount of humidity was controled in dependence on supposed risks connected with influence of air moisture, water vapour condensation and risk of water impact in 3 levels: 3%, 6% a 9% (massic) moisture of elements. All elements were tested in wet condition and compared with tests in dry state. Heat conductivity factor was also considered.

The test results were analysed from selected range of environmental criterions. The results of research could be used (1) in application of unburned clay in modern building structures, (2) for reconstructions of current building with structures using unburned clay, (3) for reconstructions of cultural monuments, (4) and by processing of national standards enabling wider use of unburned clay in contemporary building structures.

KEY WORDS :

earthen material properties, unburned bricks, influence of humidity, way of stabilization