RESEARCH ON ADOBE BRICKS FOR SUSTAINABLE/TRADITIONAL BUILDING

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ABSTRACT

Clay mixtures can be successfully used to build masonry bricks, mortars, plasters and green finishes. However, modern buildings require to meet severe performance requirements and admissibility criteria, much more easy to be achieved with modern materials. Despite this reality, the most important features of a building characterized by sustainability can be described using the four R: Reduced, Reuse, Recycle and Recovery. For such buildings, less material and energy is consumed than to a conventional building. The materials used should be recycled and should allow re-use after the end of the building's lifespan. Natural / traditional building is derived from materials from the environment. Straw, clay or wood are obtained from local, often family-run businesses. It supports the local development and cultural independence of the region. The low-tech natural environment is environmentally friendly. The production of materials does not require high energy and it does not produce CO_2, so it embeds less energy needed to build than the conventional modern construction. The transportation of materials is done only locally. And the structure itself is completely biodegradable and after the end of its service it does not leave harmful waste hard to decompose from the environment. The natural / traditional building is accessible to all, creates local jobs and integrates people. Construction material is cheap. All of these features are very characteristic for sustainable development. Therefore, adobe still represents a valuable solution for a large spectrum of structural elements (e.g., shells, huts, walls etc.).

The mineralogical composition of clay soils differ depending on the site of extraction, resulting in specific local properties of the building products. In this context, a research was performed to improve the mechanical performance of adobe bricksand the workability of the fresh mixture. The following additives were studied: bone glue, sodium hydroxide, salt, wheat bran, borscht, milk whey and ash. From a total of 50 mixes, the research emphasizes that the most beneficial additives are the bone glue and sodium hydroxide. The optimal concentration of bone glue is 1.25% to achieve compressive strengths of about 4.0 MPa at 40 days (higher concentrations result in mildew).A 2% sodium hydroxide added gives a better workability of the mixture and helps dissolve the bone gluefaster. Table 1 summarizes a comparison of the results with similar researches.

Tab. 1 Comparison of adobe bricks performance

Reference / Characteristic	[1]	[2]	[3]	[4]	**A*1**
Axial contraction [%]	15,0	-	17,1	25,0	**6,5**
Compressive strength [N/mm^2]	3,30	2,40	0,32	10,2	**4,10**
Flexural strength	0,63	-	-	-	**1,40**
Density [kg/m^3]	1748	1960	1050	1700	**1900**
Thermal conductivity [WmK]	-	-	0,45	0,59	**0,38**

*A1 – mix with sand 35 % and bone glue 1.25 %, Valea Drăganului /România

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