

## ENERGY PERFORMANCE ASSESSMENT OF ENVELOPES FROM ORGANIC MATERIALS

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### Abstract

The paper estimates the thermal performance of effective building envelopes from organic materials for the construction of low-rise buildings. The popular types of walls made of natural energy-efficient materials with low carbon footprint are considered in numerical assessment: hempcrete, adobe, strawbale panel, earthbag and cordwood. The influence of the constructive layer type of the envelope on the amount of thermal inertia time is analyzed. It is revealed that the hempcrete wall has the biggest thermal inertia time, the wall of the earthbags has almost ten times smaller. The walls made of adobe and strawbale panels have practically equal time of thermal inertia. For more objective analysis, by taking into account the variety of physical and physical-mechanical parameters of the envelopes' material, the concept of integral criterion of the envelope energy efficiency potential is proposed. The estimation of the integral criterion of energy efficiency potential is calculated by the Analytic Hierarchy Process and the proposed method is fulfilled. Comparison of the integral criterion of energy efficiency potential for different wall types which was made by means of two abovementioned methods has shown the same order of magnitude.

Keywords: Energy efficiency potential; Enveloping structures; Integral criterion; Organic materials; Thermal inertia.