

Thermal Dynamic Behaviour of Building Solutions Coated with Medium Density Expanded Cork Board

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ABSTRACT

The thermal behaviour of buildings is greatly influenced by the insulation of the envelope. The thermal performance of a building is strongly affected by the insulation material properties (in particular thermal conductivity, density and specific heat), its thickness and its placement within the building envelope solution. Applying the thermal insulation layer externally generally leads to an effective improvement of thermal performance since this increases its heat storage mass and consequently its thermal inertia. This also affects dynamic factors such as time lag and decrement factor. Additionally, buildings with higher thermal inertia have slower variations of indoor temperature.

The objective of the present study is to evaluate the dynamic behaviour of several building envelope solutions with insulation cork board (ICB) placed either externally or internally. Since this material can be used on the outside without any final coating, it may be subjected to rain and, consequently its water content may change. Initially, the dynamic parameters, in particular time lag and decrement factor, are calculated using ISO 13786 and compared with those obtained using an analytical model previously validated for multi-layered systems. Throughout this study, the effect of parameters such as ICB density, water content, thickness and position in several solutions are evaluated. Finally, the analytical model is used to perform a sensitivity analysis for different solutions (using real weather data).