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ABSTRACT

This paper focuses on the assessment of the hygrothermal performance of a straw bale house in the Picardie, a region of France. The house was built using a wooden load bearing frame filled with straw bales. Laboratory and *in situ* tests were carried out in this study.

In the first part, the thermal conductivity of straw bales was measured in relation to the orientation of the straw fibers. The thermal resistance of a wall built in the laboratory, respecting the real construction parameters, was assessed. The obtained U-value was compared to those of different walls used in civil field engineering.

The second part of this paper continues with an assessment of the hygrothermal performance of a real straw bale house. Temperature and relative humidity measurements were recorded during more than one year, using sensors that were placed in indoors and outdoors, and at various depths of the walls and floors.

Finally, this paper is completed by a dynamic thermal simulation of the house, based on experimental laboratory investigations. During winter the simulated heating requirements are estimated at 59 kWh/m^2. Moreover, the simulation under summer conditions shows the major influence of the building envelope on the thermal comfort. Thus, straw bale walls seems to provide significant thermal inertia in summer.

Keywords

Straw bale house, Straw bale wall, *U*-value, Hygrothermal performance, Thermal inertia, Moisture content

1. Introduction