

Composite material for thermal insulation based on moss raw material

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Highlights

- Thermal insulation compositions based on *Sphagnum* moss were studied.
- Better properties were obtained for mixed compositions of moss and rye straw.
- Inner structure of the rye straw and reed explain the resulting properties.
- Ecological insulating materials of moss, straw, reed and liquid glass were developed.

Abstract

The demand for thermal insulation materials composed of sustainable raw materials remains a challenge. The substances used in the manufacture of thermal insulation materials may also, under certain conditions, have a beneficial effect on the insulated surfaces, the environment, and the human or animal body, in particular by the ability to absorb moisture and biocidal properties. Ecological insulation materials of vegetable raw materials are increasingly widespread. Most of the time, these materials are made from flax, hemp or wood fibres, agglomerated with a binder. The objective of this work was to determine the possibility of using *Sphagnum* moss as a fibre in thermal insulation panels. To carry out this study, several compositions were developed for thermal insulation boards based on moss, rye straw and reed, using liquid glass as a binder. The specimens were tested for thermal

conductivity, and strength to compression and bending. Best results were achieved on panels of moss and straw with thermal conductivity of 0.044–0.046 W/(m.K) at a density of 156–190 kg/m³, without shrinking during drying and a compression strength between 0.20 and 0.21 MPa. Electronic microscopy of rye straw and reed stems made it possible to examine the presence of outer and inner parts in the structure, which affect the thermal and strength characteristics.

With the use of natural raw materials from plants and agricultural production residues, an effective and ecologically safe rigid board insulation was obtained, which has biocidal properties and has no analogues in the market for the construction of thermal insulation materials.

Keywords

Moss

Sphagnum

Thermal insulating

Rye straw

Reed

Liquid glass