

Sandwich panels with bio-based core of wood fibre insulation

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Abstract

In light of the climate crisis, the building sector faces the increasing challenge and urgency to improve its sustainability and significantly reduce its consumption of non-renewable resources. Therefore, the EU-funded research project InCSEB is developing ultra-low carbon footprint building steel envelope systems through the innovative use of wood fibre as a core material of sandwich panels. By using the new bio-based core material, the carbon footprint and the environmental impact of buildings with this type of envelope system can be reduced. Within the InCSEB project, various studies are being carried out on sandwich panels with a bio-based core. In addition, studies are being carried out on full-scale building prototypes with these new solutions. In this paper, the results of the static-mechanical tests and the assembly of the sandwich panels with a wood fibre core are presented to indicate the future scope of potential roof and cladding applications.

Keywords: lightweight structure, sandwich panels, wood fibre insulation, bio-based core material, mechanical tests, building prototypes, experimental studies

1 Introduction

For building constructions, sandwich panels usually consist of two metal face sheets and a core of polyurethane (PU) or mineral wool (MW). They are characterized by combination of lightweight construction, thermal insulation, and sealing function in one component. They also stand out due to their simple assembly and cost-efficient series production. Hence, sandwich panels are already established as an economical solution for

building envelopes in industrial constructions in Europe. Common dimensions of sandwich panels are thicknesses up to 240 mm and face thicknesses from 0.4 to 1 mm [1]. From the ecological point of view, the thermal insulation is important, because it allows to save not only on the continuously increasing energy costs, but also on CO₂ emissions due to less heating or cooling [1]. The ecological impact of PU sandwich panels was studied in [2]. Besides, alternative renewable core materials like corrugated cardboard have also been analysed [3].