Investigation of the Acoustic Properties of Recycled Felt Panels and Their Application in Classrooms and Multi-Purpose Halls

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Abstract : The acoustic properties of recycled felt panels have been investigated using various methods. Experimentally, the sound insulation of the panels has been evaluated for frequencies in the range of 600 Hz to 4000 Hz, utilizing a small-sized acoustic chamber. Additionally, the sound absorption coefficient for the frequency range of 63 Hz to 4000 Hz was measured according to the EN ISO 354 standard in a laboratory reverberation room. This research was deemed necessary after conducting reverberation time measurements of a university classroom following the EN ISO 3382-2 standard. The measurements indicated values of 2.86 s at 500 Hz, 3.23 s at 1000 Hz, and 2.53 s at 2000 Hz, which significantly exceeded the requirements set by the national regulatory framework (0.6s) for such premises. For this reason, recycled felt panels have been investigated in the laboratory, showing very good acoustic properties at high frequencies. To enhance performance in the low frequencies, the influence of the distance of the panel spacing was examined. Furthermore, the sound insulation of the panels was studied to expand the possibilities of their application, both for the acoustic treatment of educational and multifunctional halls and for sound insulation purposes (e.g., a suspended ceiling with an air gap passing from room to room). As a conclusion, a theoretical acoustic design of the classroom has been carried out with suggestions for improvements to achieve the necessary acoustic and aesthetic parameters for such rooms.

Keywords : acoustic panels, recycled felt, sound absorption, sound insulation, classroom acoustics
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