

Acoustic and Thermal Isolation Performance Comparison between Recycled and Ceramic Roof Tiles Using Digital Holographic Interferometry

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Abstract : Recycling, as part of any sustainable environment, is continuously evolving and impacting on new materials in manufacturing. One example of this is the recycled solid waste of Tetra Pak™ packaging, which is a highly pollutant waste as it is not biodegradable since it is manufactured with different materials. The Tetra Pak™ container consists of thermally joined layers of paper, aluminum and polyethylene. Once disposed, this packaging is recycled by completely separating the paperboard from the rest of the materials. The aluminum and the polyethylene remain together and are used to create the poly-aluminum, which is widely used to manufacture roof tiles. These recycled tiles have different thermal and acoustic properties compared with traditional manufactured ceramic and cement tiles. In this work, we compare a group of tiles using nondestructive optical testing to measure the superficial micro deformations of the tiles under well controlled experiments. The results of the acoustic and thermal tests show remarkable differences between the recycled tile and the traditional ones. These results help to determine which tile could be better suited to the specific environmental conditions in countries where extreme climates, ranging from tropical, desert-like, to very cold are experienced throughout the year.

Keywords : acoustic, digital holographic interferometry, isolation, recycled, roof tiles, sustainable, thermal

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