

Optimization of Bio-Based Lightweight Mortars Containing Wood Waste

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Abstract : In this study, wood waste from processing by-products was used by replacing natural sand for producing bio-based lightweight mortars. Manufacturers of wood products and furniture usually generate sawdust and pieces of side-cuts. These are produced by cutting, drilling, and milling operations as well. Three different percentages of substitution of quartz sand were tried: 2.5%, 5%, and 10% by volume. Wood by-products were pre-soaked in calcium hydroxide aqueous solution in order to obtain wood mineralization to avoid undesirable effects on the bio-based building materials. Bio-based mortars were characterized by means of compression and bending tests, free drying shrinkage tests, resistance to water vapour permeability, water capillary absorption, and, finally, thermal conductivity measurements. Results obtained showed that a maximum dosage of 5% wood by-products should be used in order to avoid an excessive loss of bio-based mortar mechanical strength. On the other hand, by adding the proper dosage of water-reducing admixture, adequate mechanical performance can be achieved even with 10% wood waste addition.

Keywords : bio-based mortar, energy efficiency, lightweight mortar, thermal insulation, wood waste

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