

Investigation of thermal insulation properties of biomass composites

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Abstrak

This paper reports on the investigation of thermal properties of Kapok, Coconut fibre and Sugarcane bagasse composite materials using molasses as a binder. The composite materials were moulded into 12 cylindrical samples using Kapok, Bagasse, Coconut fibre, Kapok and Bagasse in the ratios of (70:30; 50:50 and 30:70), Kapok and Coconut fibre in the ratios of (70:30; 50:50 and 30:70), as well as a combination of Kapok, Bagasse and Coconut fibre in ratios of (50:10:40; 50:40:10 and 50:30:20). The sample size is a 60mm diameter with 10mm – 22mm thickness compressed at a constant load of 180N using a Budenberg compression machine. Thermal conductivity and diffusivity tests were carried out using thermocouples and the results were read out on a Digital Multimeter MY64 (Model: MBEB094816), while a Digital fluke K/J thermocouple meter PRD-011 (S/NO 6835050) was used to obtain the temperature measurement for diffusivity. It was observed that of all the twelve samples moulded, Bagasse, Kapok plus Bagasse (50:50), Kapok plus Coconut fibre (50:50) and Kapok plus Bagasse plus Coconut fibre (50:40:10) has the lowest thermal conductivity of 0.0074, 0.0106, 0.0132, and 0.0127 W/(m-K) respectively and the highest thermal resistivity. In this regard, Bagasse has the lowest thermal conductivity followed by Kapok plus Bagasse (50:50), Kapok plus Bagasse plus Coconut fibre (50:40:10) and Kapok plus Coconut fibre (50:50).