

Abstract

The objective of the thesis is to comparatively study the building insulation properties of the insulation material made from comcob and cassava at the densities of 200, 400 and 800 kg/m³. The study is conducted through the analysis of the Thermal Conductivity (k), Thermal Resistance (R) and Thermal Conductance (C). There is also a comparison of the thermal performance and the cost of building insulation made from comcob, cassava and fiberglass with fiber cement board on the exterior wall and interior wall as well as the interior air temperature. Moreover, the study compares the thermal performance and the cost of building interior wall, made from comcob and cassava with plywood interior partition with fiber cement board on the exterior. At the initial stage, the building insulation properties are tested by using thermal conductivity measurement. The next stage of the test is to place the test models facing South for 5 consecutive days and take the readings for statistical analysis.

The result of the research shows that both of the subjects have good insulation properties at 200 kg/m³ and the thickness of 1.00 cm. The statistical significance between the two is at 0.05 with Thermal Conductivity of 0.059 and 0.063 W/m.K respectively, which prove to be better than the higher density insulation of the same material. Furthermore, the statistical analysis of the interior air temperature reveals that the cassava insulator at the density of 200 kg/m³ and the thickness of 1.00 cm. is indifferent to the fiberglass with the density of 16 kg/m³ and 2.50 cm. thickness in terms of thermal performance with statistical significance at 0.05. However, when used with the test partition, both of the insulations can decrease the temperature by 2.33-3.27 °C. Furthermore, the cassava insulator costs only 150 Baht/m², which is 86.20 % cheaper than fiberglass at 16 kg/m³ density. Finally, when compared to the interior wall, made from cassava with the density of 800 kg/m³ and 1.00 cm. thickness and comcob interior wall with the density of 800 kg/m³ and 1.00 cm. thickness has similar thermal performance with statistical significance at 0.05. However, the interior wall, made from cassava with the density has better thermal performance than grade A plywood with the density of 571.04 kg/m³ and 0.80 cm. thickness according to the statistical analysis of the interior air

temperature with difference in temperature at 3.03 °C. Furthermore, the cassava interior wall cost only 401 Baht/sheet, which is 85.31 % cheaper than grade A plywood.

In conclusion, the building insulation material produced from agricultural waste especially a cassava insulator density 200 kg/m³ has the potentials to be developed into building insulation. However, there are remaining practical factors needed to be resolved such as long-term deterioration due to, humidity and thermal bridge. Also, the interior wall, made from cassava at density 800 kg/m³ and 1.00 cm. thickness has the suitable characteristics and efficiency that can be a substitute for plywood as an interior building material in the future.