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Binder-less Wood Chip Insulation Panel for Building Use Made from Wood Processing Residues and Wastes IV. Heat storage capacity of full-scale thick panels manufactured using wood shavings

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Abstract: This paper describes thermal properties of binder-less wood chip insulation panels, focusing especially on the effect of panel thickness and on comparisons with the glass wool and phenolic foam panels commonly used as insulation material for buildings. Insulation panels with a density of 100 kg/m³ and thicknesses ranging from 50 to 150 mm were manufactured using wood shavings derived from a wood processing factory. Our panels were measured for thermal conductivity and diffusivity by analyzing heat flux through a simple wall model under an unsteady temperature schedule. The results obtained are as follows : 1) Thermal conductivity of our panel was about 0.060 W/mK for the practical thicknesses of 100 to 150 mm. 2) Heat inflow to the wall with our insulation panel was less than that of the glass wool and phenolic foam panels when compared at the same thermal resistance level. 3) Thermal diffusivity of our panels (0.41×10^{-6} m²/s) was about half the value of the glass wool and three quarters of that of the phenolic foam panels since our panels have higher density and specific heat than the others. The results characterize our panels as having thermal insulation capacity that can be superior to that of glass wool and phenolic foam panels due to greater heat storage capacity.

Keywords: insulation panel, wood shavings, thermal conductivity, thermal diffusivity, heat storage capacity



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