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## **Binder-less Wood Chip Insulation Panel for Building Use Made from Wood Processing Residues and Wastes V.**

### **Thermal conductivity and drop impact resistance of sugi bark chip panels**

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**Abstract:** In this series of studies, a manufacturing technology was developed which uses wood flakes or shavings for binder-less insulation panels used in buildings. This paper describes the use of sugi (*Cryptomeria japonica* D. Don) bark chips in our panels for the purpose of expanding the choice of potential raw materials. Bark chip panels ranging in density from 100 to 180 kg/m<sup>3</sup> were manufactured using bark chips of three different sizes. Thermal conductivity and drop impact resistance were tested and compared to our conventional panels made with wood flakes or shavings. The best panel performance which balances superior thermal insulation properties and superior drop impact resistance was obtained for panels with a density of 140 kg/m<sup>3</sup> (optimum panel density), irrespective of the bark chip size. The bark chip panels at that density showed better thermal insulation properties (a thermal conductivity of 0.07 W/mK) and better drop impact resistance than the sugi wood flake panels with the same density. When compared to the wood shaving panels, however, the thermal insulation properties of the bark chip panels were found to be inferior in terms of higher thermal conductivity, because the thermal conductivity of the wood shaving panels was lower (0.06 W/mK) due to the lower optimum panel density of around 100 kg/m<sup>3</sup> to maintain drop impact resistance.

**Keywords:** insulation panel, sugi bark, thermal conductivity, drop impact



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