

Adhesion and bonding characteristic of preservatives treated bamboo (*Gigantochloa scortechinii*) laminates

Abstract

This study were investigate the adhesion and bonding characteristics of bamboo (*Gigantochloa scortechinii*) strips and laminates treated with permethrin-based preservative (Light Organic Solvent-Based (LOSP) and Water-Based (WBP)) formulations, Tributyl Tin Oxide (TBTO) and borax. The bamboo culm were cut into strips and treated with those selected chemicals. The bamboo strips were then glued edge to edge to form a bamboo veneers before fabrication of the three ply perpendicular bamboo laminates. In this research the properties studied include wettability, buffering capacity, shear strength and wood failure. Untreated strips and bamboo strips which were boiled in water (100°C) were also tested for comparison purposes. Those strips treated with LOSP had higher contact angle (3°-9°) which reflects that the surface of the treated strips is less readily wetted. Whereas, borax-treated strips had the highest wetting rate where the value is 1°. In buffering capacity study shows that treated bamboo was more stable towards alkali. This is suggested that a buffering agent (Calcium carbonate) is required in the adhesive formulation to ensure sufficient curing of the resin. Preservative treatments on bamboo strips significantly affect shear strength and wood failure of the laminates. Shear and wood failure of the laminated bamboo were significantly reduced especially in the wet condition where, the range is 0 N mm⁻² (WBP treated) to 0.65 N mm⁻² (boiled-treated) when compared to untreated bamboo laminates (0.79 N mm⁻²). While, in dry condition test, the glue bond strength of were range from 0.64 N mm⁻² (WBP-treated) to 2.04 N mm⁻² (borax-treated). All chemicals and non-chemical treatment generally affects the glue strength of the bamboo laminates especially in wet condition test. In dry condition test there are slightly reductions in glue bond strength but the quality still meets the requirement in the British Standard Part 8: Specification for Bond Performance of Veneer Plywood.