ABSTRACT

Effect of Thickness Combination and Lamina Orientation on Characteristics of Cross Laminated Timber Made from Sengon Wood (Paraserianthes falcataria L. Nielsen)

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Nowadays timber supply from natural forests was not sufficient, so it caused the wood processing industries switched to used timber from community forests. Timber supply from community forests has poor quality for construction material, so the new technology should be applied to produce high quality structural timber. Along with the technological developments, a new method of laminated timber has been found, called cross laminated timber (CLT). Cross Laminated Timber is a new generation of lightweight and prefabricated system that consists of wood lamina stacked crosswise on top of each other (glued or nailed). The purpose of this research was to test the effect of modification combined patterns of different thickness and orientation angles of lamina about physical and mechanical properties of a panel of CLT from sengon wood. Raw materials are sengon wood from community forest that was sawed into layers and formed with the cross-sectional size of 5 cm x 15 cm x 120 cm, namely type A1 (1 cm, 3 cm, and 1 cm), type A2 (1.67 cm, 1.67 cm, and 1.67 cm), and type A3 (1 cm, 2 cm, and 1 cm). The middle layer was based on the orientation angles of lamina: 0°, 30°, 45°, 60°, and 90°. The adhesive used was water-based polymer isocyanate (WBPI) with the glue spread into 280 g/m² for both surfaces. Testing was based on ASTM D 143 (2005) and JAS 234:2003. Result showed that the combination of thickness and angle orientation of lamina affected physical and mechanical properties of CLT. The thickness combination was influence to MOE, bonding shear, and compression parallel to grain of CLT. The orientation of angle was influence to swell and shrinkage in volume, bonding shear, and compression parallel to grain CLT. The interaction between thickness and angle orientation of lamina was influence MOR CLT. Meanwhile, delamination test showed that isocyanate was not complied with a request of JAS 234:2003 for boil water immersion.

Keywords: Combination thickness, cross laminated timber, lamina orientation, sengon

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