EVALUATION OF BRAZILIAN REFORESTATION SPECIES IN GLULAM BEAMS BEFORE AND AFTER PRESERVATIVE CHEMICAL TREATMENTS

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ABSTRACT: Although the glulam is a product of the nineteenth century, there are few industries in Brazil. The high cost of the structural elements of glulam is committed at the time, its competitiveness with full tropical sawn timber and reforestation. Being a tropical country, we recommend the use of wood treated to prevent termites attack. This study aims to evaluate the resistance of glulam beams before and after being subjected to chemical treatments with pressure using CCA (Copper Chrome Arsenic) and CCB (Copper Chrome Boron). To that end, we tested 54 glulam beams with nominal dimensions of 9 cm x 9 cm x 200 cm, with wood harvested from forest plantations. These beams were subjected to static bending tests, according to Brazilian standard NBR 8458:1984. After analyzing the experimental data it was concluded that the glulam beams produced from wood of *Pinus oocarpa* had the best results, taking into account the combination wood-adhesive-treatment, because the physical properties remained the same before and after chemical treatment in fullcell method.

KEYWORDS: Glued laminated timber (glulam), Wood reforestation, Chemical treatment

1 INTRODUCTION

The glulam is an engineered wood product that requires precision manufacturing in all its stages. The finished product can only be tested in laboratory conditions, so you need quality control in production to ensure that the physical properties of the glulam are appropriate to those specified in current standards, according to [1]. The glulam is a structural component consisting of a combination of selected wood laminae, bonded with waterproof adhesive, pressure variable from 0.7 to 1.5 MPa. The blades, attached by glue, are arranged so that its fibers are parallel to each other [2].

The objective of this work was to evaluate the resistance of the glulam beams produced from reforested wood planted in Brazil. This evaluation was done by means of standard static test in the Brazilian standard [3]. This paper deals with the method of construction, test crosses of glulam and their specimens taken from them.

2 MATERIALS AND METHODS

For the production of glulam beams were used species of wood *Teak* (*Tectona grandis*), *Pinus oocarpa* (*Pinus oocarpa shied*) and *Lyptus*® (registered trademark of Aracruz Produtos de Madeira (APM)). All these woods have been extracted from renewable forests of trees planted in Brazil, so without running the risk of damaging the environment. For each species produced 18 glulam beams, 9 glued with resorcinol adhesive phenol formaldehyde (RFF) and 9 with adhesive polyurethane (PUR), totaling 54 glulam beams for the three species of wood. After the production the glulam beams was treatment with basis of chemical preservative CCA (Copper Chrome Arsenic) and CCB (Copper Chrome Boron) in fullcell method, to protect against the attack of insects. The production process of 54 glulam beams follows the following steps: storage timber; visual rating; rating mechanics, grouping of wood, processing of the laminae;
manufacturing crosspieces; drilling and rounding of the upper surface; preservative treatment against insects; storage of glulam beams. Such glulam beams were placed with an intensity of pressure of 1.0 MPa, non-random distribution of weight for both laminae and the adhesives was applied with two spreading rate of 300 to 350 g/m². The glulam beams had length of 200 cm and cross section of 9 cm x 9 cm and were made with three pieces of wood, each laminae with 30 mm thick. Figure 1 shows the fabrication of glulam beams.

Tests for resistance to bending of glulam beams were performed to evaluate the mechanical properties requirements, according to Brazilian standard [3]. Figure 2 shows the test of resistance to bending of glulam beams.

Was also observed that the glulam beams made from Teak woods and Lyptus®, did not change its mass, showing that the chemical treatment in fullcell method did not penetrate them. However, the glulam beams from Pinus oocarpa changed its mass. During the endurance tests after chemical treatment showed that the rupture occurred at the glue line delamination in various glulam beams made from Lyptus® wood.

Overall the manufacture of glulam beams from reforested wood is certainly a big draw, because besides having an excellent strength/weight does not cause environmental damage and contributes to carbon sequestration from the atmosphere.

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REFERENCES