

Measurement on Properties of Empty Fruit Bunch Oil Palm Composite Boards at Different Density and Resin Contents

ABSTRACT

Background: The objective of this study is to measure the properties of composite boards made from oil palm empty fruit bunch (OPEFB) at different density and resin contents. The oil palm empty fruit bunches were obtained from an oil palm plantation and refined using fibre cutter and particle crusher. Hardeners and wax added at 1% and 3% during the mixing process. Boards of densities 500, 600 and 700 kg m⁻³ produced with resin urea formaldehyde at 10, 12 and 14% respectively. The boards stored in a conditioning chamber set at 20±2°C and 65% relative humidity before undergoing subsequent testing. The testing procedure followed the EN Standard of specifications. The results indicated increases across the board physical and mechanical properties. The highest modulus of rupture (MOR) and modulus of elasticity (MOE) value achieved in this study were 22.91 N mm⁻² and 2059.56 N mm⁻². The highest value for internal bonding (IB) was 0.98 N mm⁻², for edge and face screw withdrawal the IB were 467.47 N mm⁻² and 512.37 N mm⁻². Boards with 700 kg m⁻³ density and 14% resin contents met the requirement in accordance to the established standard. Board with 500 kg m⁻³ density and 10% resin content observed microscopy showed voids in some of the resin-fibre bonding areas at the cross-section of the board. This suggested that moisture somehow penetrated into the board via the open spaces and attacked the linkages existed causing in the low property. Thermogravimetric analysis conducted in the thermal stability of the boards showed maximum rate of decomposition for the OPEFB boards at 380.83°C. In conclusion, the board's density and resin content applied influenced on the boards overall properties.