INTISARI

Jumlah produksi ban di dunia mencapai 1,4 miliar unit per tahun. Indonesia, sebagai produsen karet terbesar kedua di dunia, menyumbang ban kendaraan bermotor dengan jumlah total 150,2 juta unit pada tahun 2019. Pembuangan ban bekas meningkat 2% per tahun. Pembuangan ban bekas secara konvensional berdampak negatif terhadap lingkungan, kesehatan, dan ekonomi. Ban bekas berpotensi untuk dimanfaatkan sebagai bahan bangunan, termasuk penutup atap. Tujuan penelitian ini adalah untuk menghasilkan model penutup atap dari tali ban bekas menggunakan teknologi sederhana tepat guna, serta menguji performa model penutup atap dengan sistem konstruksi multilapis terhadap air dan panas matahari untuk menilai efektivitas model penutup atap. Penelitian ini menggunakan metode eksperimen. Model penutup atap dikonstruksikan dalam bentuk panel 50 x 50 cm dengan tiga variasi metode pemasangan dan alat sambung. Rangka atap skala 1:1 dibuat sebagai sel uji. Pengujian performa terhadap air dilakukan dengan menyemprotkan air ke model penutup atap yang telah dilapisi kertas berkode di bagian belakang. Pengamatan langsung diadakan untuk mengidentifikasi rembesan air. Pengujian performa terhadap panas matahari dilangsungkan dengan mengukur suhu permukaan luar dan dalam model penutup atap menggunakan *infrared thermometer*, serta suhu udara menggunakan *temperature data logger*. Model penutup atap A; dengan metode pemasangan tali ban bekas ditumpuk datar dengan komposisi vertikal menggunakan alat sambung lem kuning, memiliki efektivitas tertinggi dari segi konstruksi; karena paling hemat dari sisi penggunaan material, paling mudah dalam proses pembuatan, dan membutuhkan waktu pengerjaan paling singkat. Model A juga paling efektif dalam menahan air karena tidak ada rembesan air. Model B; dengan metode pemasangan tali ban bekas ditumpuk miring dengan komposisi horizontal menggunakan alat sambung jahitan tali rafia, mengalami rembesan air paling banyak. Model C; dengan tali ban bekas yang disusun kombinasi secara vertikal dan horizontal menggunakan anyaman tunggal, paling efektif dalam mereduksi hantaran radiasi matahari, kebalikan dari Model A. Model A memiliki efektivitas tertinggi secara keseluruhan; berdasarkan aspek pembuatan dan pengujian. Model C menempati peringkat kedua dan Model B menunjukkan efektivitas paling rendah.

Kata kunci: ban bekas, penutup atap, sistem konstruksi multilapis, efektivitas, eksperimen

ABSTRACT

Total tire production in the world reaches 1.4 billion units per year. Indonesia, as the world's second largest rubber producer, contributed motor vehicle tires with a total of 150.2 million units in 2019. Disposal of tire waste increased by 2% per year. Conventional disposal of tire waste has a negative impact on the environment, health, and the economy. Tire waste has the potential to be used as building materials, including roof coverings. The purpose of this study was to produce roof covering models from waste tire cords using simple effective technology, as well as to test the performance of roof covering models with a multilayer construction system against water and solar heat to assess the effectiveness of the roof covering models. This research used experimental method. The roof covering models were constructed in the form of 50 x 50 cm panels with three variations of installation methods and connecting devices. A 1:1 scale roof truss was made as a test cell. Water performance testing was carried out by spraying water on the roof covering model which has been coated with coded paper on the back. Direct observations were made to identify water seepage. Performance testing against solar heat was carried out by measuring the outside and inside surface temperatures of the roof covering models using an infrared thermometer, as well as the air temperature using a temperature data logger. Roof covering model A; with the method of installing waste tire cords stacked flat with a vertical composition using a yellow glue jointer, has the highest effectiveness in terms of construction; because it is the most economical in terms of material use, the easiest in the manufacturing process, and requires the shortest processing time. Model A is also the most effective at retaining water because there was no water seepage. Model B; with the method of installing used tire cords stacked sideways with a horizontal composition using a raffia seam joint, experienced the most water seepage. Model C; with waste tire cords arranged in combination vertically and horizontally using a single type of webbing, the most effective in reducing the conduction of solar radiation, the opposite of the Model A. Model A has the highest overall effectiveness; based on aspects of manufacture and testing. Model C is ranked second and Model B shows the lowest effectiveness.

Keywords: *tire waste, roof covering, multilayer construction system, effectiveness, experimen*