ABSTRAK

Peningkatan kebutuhan beton menyebabkan tingginya eksploitasi agregat halus berupa pasir alam yang berdampak pada kerusakan lingkungan, sementara limbah bata ringan dari industri konstruksi belum dimanfaatkan secara optimal. Penelitian ini bertujuan untuk menganalisis pengaruh pemanfaatan limbah bata ringan sebagai substitusi parsial agregat halus terhadap kuat tekan beton mutu K-200 serta menentukan kadar optimum yang masih memenuhi standar. Metode yang digunakan adalah eksperimen laboratorium dengan variasi substitusi sebesar 0%, 1%, 2,5%, dan 5% dari berat agregat halus. Benda uji berbentuk silinder berukuran 15 × 30 cm dan diuji pada umur 7, 14, dan 28 hari menggunakan Compression Testing Machine (CTM). Hasil penelitian menunjukkan bahwa limbah bata ringan memiliki berat jenis rendah dan daya serap air tinggi yang mempengaruhi sifat mekanik beton. Substitusi pada kadar rendah masih menghasilkan kuat tekan yang mendekati beton normal, sedangkan kadar tinggi menyebabkan penurunan kuat tekan akibat meningkatnya porositas. Variasi 2,5% menunjukkan hasil paling optimal, sehingga limbah bata ringan berpotensi digunakan sebagai material alternatif ramah lingkungan dalam campuran beton.

Kata Kunci: Limbah Bata Ringan, Beton K-200, Kuat Tekan, Agregat Halus.

ABSTRACK

The increasing demand for concrete has led to the excessive exploitation of fine aggregates, such as natural sand, which has resulted in environmental damage, while lightweight brick waste from the construction industry has not yet been optimally utilized. This study aims to analyze the effect of using lightweight brick waste as a partial substitute for fine aggregates on the compressive strength of K-200 grade concrete and to determine the optimal replacement rate that still meets the standards. The method used was a laboratory experiment with substitution variations of 0%, 1%, 2.5%, and 5% of the fine aggregate weight. The test specimens were cylindrical in shape, measuring 15 × 30 cm, and were tested at 7, 14, and 28 days using a Compression Testing Machine (CTM). The results of the study indicate that lightweight brick waste has a low bulk density and high water absorption, which affect the mechanical properties of concrete. Substitution at low levels still yields compressive strength close to that of normal concrete, whereas high levels cause a decrease in compressive strength due to increased porosity. The 2.5% substitution level showed the most optimal results, indicating that lightweight brick waste has the potential to be used as an environmentally friendly alternative material in concrete mixtures.

Keywords: Lightweight Brick Waste, K-200 Concrete, Compressive Strength, Fine Aggregate.