

ABSTRAK

Berkatson Nitehe Harefa: Pengaruh Variasi Campuran Limbah Plastik dan Serbuk Kaca Terhadap Kuat Tekan Paving block Sebagai Upaya Pemanfaatan Material Daur Ulang. Skripsi. Fakultas Teknik Universitas Negeri Medan, 2026

Peningkatan jumlah limbah plastik *Polyethylene Terephthalate* (PET) dan limbah kaca menimbulkan permasalahan lingkungan yang semakin kompleks serta membutuhkan strategi pemanfaatan yang berkelanjutan. Sektor konstruksi menawarkan peluang pemanfaatan limbah anorganik sebagai material alternatif, khususnya pada produk perkerasan non-struktural. Penelitian ini bertujuan untuk menganalisis pengaruh variasi campuran limbah plastik PET dan serbuk kaca terhadap kuat tekan dan daya serap air *paving block*, serta mengevaluasi mutu *paving block* yang dihasilkan berdasarkan ketentuan Standar Nasional Indonesia (SNI) 03-0691-1996.

Penelitian ini menggunakan metode eksperimen dengan pendekatan kuantitatif. Objek penelitian berupa *paving block* yang dibuat menggunakan plastik PET sebagai bahan pengikat dan serbuk kaca sebagai bahan pengisi. Variasi campuran pasir dan plastik PET terdiri atas empat perbandingan, yaitu 1:0,5:5%; 1:0,75:5%; 1:1:5%; dan 1:1,25:5%, dengan penambahan serbuk kaca sebesar 5% dari berat pasir pada setiap variasi. Data diperoleh melalui pengujian kuat tekan dan daya serap air di laboratorium. Analisis data dilakukan menggunakan statistik deskriptif, uji normalitas, uji homogenitas, uji Welch, serta ANOVA satu arah untuk menginterpretasikan pengaruh variasi campuran terhadap karakteristik *paving block*.

Hasil penelitian menunjukkan bahwa rata-rata kuat tekan *paving block* pada variasi 1:0,5:5% sebesar 19,69 MPa; variasi 1:0,75:5% sebesar 12,33 MPa; variasi 1:1:5% sebesar 9,60 MPa; dan variasi 1:1,25:5% sebesar 8,64 MPa. Nilai daya serap air rata-rata berturut-turut sebesar 1,19% ; 1,05%; 0,97%; dan 0,83%. Peningkatan proporsi plastik PET terhadap pasir menyebabkan penurunan kuat tekan, namun diikuti dengan kecenderungan penurunan daya serap air. Hasil ini menunjukkan bahwa variasi campuran limbah plastik PET dan serbuk kaca menghasilkan performa *paving block* yang berbeda, dengan sebagian variasi memenuhi persyaratan kuat tekan minimum dan seluruh variasi memenuhi batas daya serap air sesuai standar SNI.

Kata kunci: Daya Serap Air, Kuat Tekan, Limbah Plastik PET, Material Hijau, Paving block, Serbuk Kaca.

ABSTRACT

Berkatson Nitehe Harefa: *Effect of Variations in Plastic Waste and Glass Powder Mixtures on the Compressive Strength of Paving blocks as an Effort to Utilize Recycled Materials. Undergraduate Thesis. Faculty of Engineering, Unimed, 2026.*

The increasing volume of Polyethylene Terephthalate (PET) plastic waste and glass waste has led to increasingly complex environmental problems and requires sustainable utilization strategies. The construction sector offers opportunities for the use of inorganic waste as alternative materials, particularly in non-structural pavement products. This study aims to analyze the effect of variations in PET plastic waste and glass powder mixtures on the compressive strength and water absorption of paving blocks, as well as to evaluate the quality of the resulting paving blocks based on the requirements of Indonesian National Standard (SNI) 03-0691-1996.

This research employed an experimental method with a quantitative approach. The research object consisted of paving blocks produced using PET plastic as a binder and glass powder as a filler material. The mixture variations of sand and PET plastic were prepared in four ratios, namely 1:0.5:5%; 1:0.75:5%; 1:1:5%; and 1:1.25:5%, with the addition of glass powder at 5% of the sand weight for each variation. Data were obtained through laboratory compressive strength and water absorption tests. Data analysis was conducted using descriptive statistics, normality tests, homogeneity tests, Welch tests, and one-way ANOVA to interpret the effect of mixture variations on the characteristics of the paving blocks.

The results indicate that the average compressive strength of paving blocks for the 1:0.5:5% variation was 19.69 MPa; for the 1:0.75:5% variation, 12.33 MPa; for the 1:1:5% variation, 9.60 MPa; and for the 1:1.25:5% variation, 8.64 MPa. The average water absorption values were 1.19%, 1.05%, 0.97%, and 0.83%, respectively. An increase in the proportion of PET plastic relative to sand resulted in a decrease in compressive strength, accompanied by a decreasing trend in water absorption. These findings demonstrate that variations in PET plastic waste and glass powder mixtures produce different paving block performances, with some variations meeting the minimum compressive strength requirements and all variations satisfying the water absorption limits according to SNI standards.

Keywords: *Compressive Strength, Green Materials, Paving blocks, PET Plastic Waste, Glass Powder, Water Absorption.*