

PEMANFAATAN SAMPAH PLASTIK *POLYPROPYLENE* DAN SILIKA DARI LIMBAH KACA PADA RELIEF DINDING TIRUAN

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ABSTRAK

Sampah plastik dan limbah kaca menjadi permasalahan global yang belum teratasi dengan optimal. Disisi lain, produk konstruksi seperti relief dinding tiruan masih bergantung pada material pasir dan semen yang berdampak negatif terhadap lingkungan. Penelitian ini bertujuan untuk mengevaluasi pengaruh penambahan sampah plastik *polypropylene* (PP) dan silika dari limbah kaca terhadap kualitas dan ketahanan lingkungan relief dinding tiruan. Relief dinding dibuat dengan campuran pasir dan semen dengan perbandingan 3:1 dan ditambah air secukupnya. Material pengisi pasir secara bertahap diganti serbuk plastik PP, sementara semen sebagai perekat diganti sebagian dengan serbuk kaca. Variabel yang dikaji meliputi pengaruh serbuk plastik, kaca, dan rasio air dan bahan perekat terhadap kuat tekan, densitas, dan durabilitas, meliputi daya serap air, daya serap absorpsi-desorpsi, ketahanan sulfat dan asam. Hasil penelitian menunjukkan bahwa substitusi pasir sebesar 20% dan semen sebesar 15% dengan serbuk plastik PP dan limbah kaca, serta rasio air terhadap bahan pengikat sebesar 1,8, menghasilkan relief dinding tiruan dengan karakteristik densitas, daya serap air, dan kuat tekan masing-masing sebesar 1431 kg/m³, 10,67%, dan 5,39 MPa yang telah memenuhi standar ASTM C129-06 tentang panel beton ringan. Uji kualitas terhadap ketahanan lingkungan menunjukkan formulasi optimal memiliki daya serap air di udara yang rendah, dengan ketahanan terhadap lingkungan sulfat dan asam lebih baik, namun memiliki kemampuan menahan air lebih lama dibandingkan formulasi kontrol.

Kata kunci: Relief dinding tiruan, plastik *polypropylene*, limbah kaca, kuat tekan, ketahanan lingkungan

UTILIZATION OF POLYPROPYLENE PLASTIC WASTE AND SILICA FROM GLASS WASTE IN ARTIFICIAL WALL RELIEFS

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ABSTRACT

Plastic and glass waste remain global environmental issues that have yet to be optimally addressed. On the other hand, construction products such as artificial wall reliefs still heavily rely on sand and cement materials, which have negative environmental impacts. This study aims to evaluate the effect of incorporating polypropylene (PP) plastic waste and silica derived from glass waste on the quality and environmental durability of artificial wall reliefs. The wall reliefs were produced using a sand-to-cement ratio of 3:1 with the addition of sufficient water. Sand filler was gradually replaced with PP plastic powder, while cement binder was partially substituted with glass powder. The variables examined included the effects of plastic powder, glass powder, and the water-to-binder ratio on compressive strength, density, and durability, encompassing water absorption, absorption-desorption capacity, and resistance to sulfate and acidic environments. The results showed that substituting 20% of the sand and 15% of the cement with PP plastic and glass powder, combined with a water-to-binder ratio of 1.8, produced artificial wall reliefs with density, water absorption, and compressive strength values of 1431 kg/m³, 10.67%, and 5.39 MPa, respectively, meeting the ASTM C129-06 standard for lightweight concrete panels. Environmental durability tests indicated that the optimal formulation exhibited low airborne water absorption, improved resistance to sulfate and acidic environments, although it retained water longer compared to the control formulation.

Keywords: *Artificial wall relief, polypropylene plastic, glass waste, compressive strength, environmental durability*