

ABSTRACT

THE EFFECT OF RICE HUSK ASH AND GLASS POWDER AS ADDITIVE MATERIALS ON THE COMPRESSIVE STRENGTH OF NORMAL CONCRETE

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Concrete is the most widely used construction material, while cement production contributes approximately 7% of global CO₂ emissions. This study aimed to analyze the effect of rice husk ash (RHA) and glass powder (GP) on cement setting time, slump value, and compressive strength of normal concrete with a design strength of K-300 ($f'_c = 25$ MPa). Rice husk ash was added at 8%, 10%, and 12% of cement weight, while glass powder was added at 2.5% of fine aggregate weight. Cube specimens measuring $15 \times 15 \times 15$ cm were tested at 28 and 56 days using the SNI 7656:2012 mix design method.

The results showed that all variations satisfied the cement setting time requirements based on SNI 15-2049-2004. The addition of glass powder improved the workability of concrete, while the use of rice husk ash above 8% reduced slump values due to the water absorption characteristics of fine particles. Normal concrete achieved a compressive strength of 25.68 MPa at 28 days, whereas the variations containing rice husk ash demonstrated better compressive strength development at 56 days due to the pozzolanic reaction. The GP2.5RH10 variation showed the highest compressive strength among all rice husk ash variations, with an increase of 3.72 MPa from 28 to 56 days.

It can be concluded that the combination of 2.5% glass powder and 10% rice husk ash provided the most balanced performance in terms of workability and long-term compressive strength potential.

Keywords: Compressive strength, glass powder, normal concrete, pozzolanic reaction, rice husk ash, workability.

ABSTRAK

PENGARUH ABU SEKAM PADI DAN SERBUK KACA SEBAGAI BAHAN PENAMBAH TERHADAP KUAT TEKAN BETON NORMAL

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Beton merupakan material konstruksi yang paling banyak digunakan, namun produksi semen sebagai bahan utama beton menyumbang sekitar 7% emisi CO₂ global. Penelitian ini bertujuan menganalisis pengaruh penambahan abu sekam padi (ASP) dan serbuk kaca (SK) terhadap waktu pengikatan semen, nilai slump, dan kuat tekan beton normal mutu K-300 ($f'_c = 25$ MPa). Abu sekam padi digunakan sebesar 8%, 10%, dan 12% dari berat semen, sedangkan serbuk kaca digunakan sebesar 2,5% dari berat agregat halus. Pengujian dilakukan pada benda uji kubus $15 \times 15 \times 15$ cm umur 28 dan 56 hari dengan metode mix design SNI 7656:2012.

Hasil penelitian menunjukkan bahwa seluruh variasi masih memenuhi syarat waktu pengikatan semen berdasarkan SNI 15-2049-2004. Penambahan serbuk kaca meningkatkan workability beton, sedangkan penggunaan abu sekam padi di atas 8% menurunkan nilai slump akibat sifat penyerapan air partikel halus. Kuat tekan beton normal mencapai 25,68 MPa pada umur 28 hari, sedangkan variasi dengan ASP menunjukkan perkembangan kuat tekan yang lebih baik pada umur 56 hari akibat reaksi pozzolanik. Variasi GP2,5RH10 menunjukkan nilai kuat tekan terbesar di antara seluruh variasi dengan abu sekam padi dan terdapat peningkatan yaitu sebesar 3,72 MPa dari umur 28 ke 56 hari.

Disimpulkan bahwa kombinasi serbuk kaca 2,5% dan abu sekam padi 10% memberikan hasil paling optimal terhadap workability dan potensi peningkatan kuat tekan jangka panjang.

Kata kunci: Abu sekam padi, beton normal, kuat tekan, reaksi pozzolanik, serbuk kaca, workability.