

APLIKASI BETON RINGAN *POLYSTYRENE* UNTUK PANEL DINDING TEBAL 7 CM DENGAN METODE PENGEMPAAN TERUKUR

Jimmy Arwi Siregar¹, Ir. Suprpto Siswosukarto, Ph.D², Ashar Saputra, S.T., M.T., Ph.D³.

INTISARI

Ketersediaan bahan alam dan eksploitasinya mendorong dilakukannya pemanfaatan bahan lain seperti bahan limbah yang belum banyak dimanfaatkan untuk bahan bangunan. *Polystyrene* sebagai limbah yang tidak terurai oleh alam di daur ulang agar dapat dimanfaatkan sebagai panel dinding beton. Panel beton adalah beton yang berbentuk lembaran dengan ukuran beragam. Panel beton yang beredar di pasaran memiliki densitas rata-rata lebih dari 2000 kg/m³ sehingga cukup berat. Kuat tekan bervariasi dari 3–50 MPa. Penggunaan panel dinding *polystyrene* adalah salah satu upaya mengurangi beban mati (*dead load*) struktur bangunan dan mempercepat pelaksanaan pekerjaan.

Pada penelitian ini dibuat suatu campuran beton ringan dari serutan limbah *polystyrene* yang direkatkan dengan semen. Panel dibuat melalui proses pengempaan terukur, ukuran panel 900 x 300 x 70 mm dengan perkuatan kawat loket diameter 0,6 mm pola grid 10 mm dan kawat loket diameter 0,81 mm pola grid 20 mm. Perbandingan campuran ditetapkan 35% semen dengan 65% *polystyrene* dan substitusi 20% pasir pada *polystyrene*, dengan menggunakan fas 0,4. Penelitian ini bertujuan untuk mengetahui berat beton *polystyrene*, kuat tekan panel, kuat lentur panel, kuat tekan kubus, serapan air dan kadar air.

Hasil Penelitian memperlihatkan beton 100% *polystyrene* mempunyai kuat tekan rata-rata 0,770 MPa dan berat satuan 685,905 kg/m³, dengan rerata serapan air 31,27% dan beton 80% *polystyrene* mempunyai kuat tekan rata-rata 0,858 MPa dan berat satuan 973,771 kg/m³ dengan rerata serapan air 16,40%. Kuat tekan dan kuat lentur panel dinding *polystyrene* tertinggi dicapai pada campuran 80% *Polystyrene* dan 20% pasir dengan perkuatan kawat loket 0,6 mm pola grid 10 mm dengan nilai kuat tekan sebesar 1,313 MPa dan kuat lentur sebesar 1,4 MPa. Hasil penelitian menunjukkan semakin bertambahnya *polystyrene* dalam adukannya, berat beton, kuat lentur, kuat tekan dan modulus elastisitas *polystyrene* semakin rendah, dan serapan air semakin tinggi. Penambahan pasir 20% dari berat *polystyrene* berpengaruh pada peningkatan kuat lentur, kuat tekan dan berat beton sedangkan serapan air turun.

Kata Kunci : Beton ringan, Panel dinding, Limbah *polystyrene*.

¹ Mahasiswa S2 Magister Teknologi Bahan Bangunan, Jurusan Teknik Sipil dan Lingkungan, Universitas Gadjah Mada Yogyakarta

² Dosen, Jurusan Teknik Sipil dan Lingkungan, Universitas Gadjah Mada Yogyakarta

³ Dosen, Jurusan Teknik Sipil dan Lingkungan, Universitas Gadjah Mada Yogyakarta

**WITH 7 CM THICKNESS
UNDER CONTROLLED PRESURIZED COMPACTION**

Jimmy Arwi Siregar¹, Ir. Suprpto Siswosukarto, Ph.D², Ashar Saputra, S.T., M.T., Ph.D³.

ABSTRACT

Availability and exploitation of natural materials encourage the use of other materials such as waste material that has not been utilized as building materials. Polystyrene is non biodegradable waste by natural recycling that can be utilized as a concrete wall panel. Concrete panels are concrete that shaped such as slabs with different sizes. Concrete panels on the market have an average density of more than 2000 kg/m³ so it is quite heavy. Compressive strength varies from 3-50 MPa. Use of polystyrene wall panel is an effort to reduce dead load of the structure and accelerate the implementation of the work.

In this study be made of a lightweight concrete mixture of shredded waste polystyrene. The panel is made through a process of compression measured, panel size 900 x 300 x 70 mm with reinforcement diameter of 0.6 mm welded mesh grid pattern of 10 mm and 0.81 mm diameter welded mesh grid pattern of 20 mm. Comparison of concrete mixture set 35% cement with 65% polystyrene and 20% sand substitution on polystyrene, using water cement ratio 0.4. This study aims to determine weight of polystyrene concrete, compressive strength of the panel, the panel flexural strength, compressive strength of cubes, water uptake and water content.

The study results showed 100% polystyrene concrete had an average compressive strength of 0.799 MPa and unit weight 685.905 kg/m³, with an average 31.27% of water uptake and 80% polystyrene concrete had an average compressive strength of 0.890 MPa and unit weight of 973.771 kg/m³ with an average 16.40% of water uptake. Compressive strength and flexural strength polystyrene wall panel reached the highest in a mixture of 80% polystyrene and 20% sand with welded mesh reinforcement diameter 0.6 mm grid pattern of 10 mm with a value of 1.313 MPa compressive strength and flexural strength of 1.4 MPa. The results showed increasing numbers of polystyrene in the mixture causes the weight of concrete, flexural strength, compressive strength and modulus of elasticity of the concrete polystyrene is lower, and increased water uptake. The addition 20% of sand affect the increase in flexural strength, compressive strength and weight of concrete while the water uptake decreased.

Keyword : Lightweight concrete, wall panels, polystyrene waste.

¹ Graduate Student in Master Program on Construction Material Technology, Civil Engineering and Environmental Department, Gadjah Mada University, Yogyakarta

² Lecture in Civil Engineering, Civil Engineering and Environmental Department, Gadjah Mada University, Yogyakarta

³ Lecture in Civil Engineering, Civil Engineering and Environmental Department, Gadjah Mada University, Yogyakarta