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Pengaruh Konfigurasi Perkuatan Cat Fiberglass Satu Sisi dan Dua Sisi terhadap Perilaku Geser In-Plane Dinding Pasangan Bata Ringan Autoclaved Aerated Concrete (AAC)
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

INTISARI

Dinding pasangan bata ringan *autoclaved aerated concrete* (AAC) memiliki kuat geser yang relatif rendah sehingga rentan terhadap beban geser searah bidang (*in-plane*) akibat gempa, sementara kebutuhan metode perkuatan yang ringan dan mudah diterapkan pada bangunan eksisting semakin meningkat. Penelitian ini bertujuan mengevaluasi pengaruh perkuatan permukaan menggunakan cat *fiberglass* (FR-*Paint*) terhadap perilaku geser *in-plane* dan moda keruntuhan dinding pasangan AAC, serta membandingkan pengaruh konfigurasi perkuatan satu sisi dan dua sisi terhadap kondisi tanpa perkuatan. Permasalahan yang dikaji adalah bagaimana perilaku geser *in-plane*, kekakuan, pola retak, dan moda keruntuhan berubah akibat penerapan FR-*Paint*. Pengujian dilakukan dengan metode tekan diagonal berdasarkan ASTM E519/E519M terhadap empat spesimen, yaitu satu spesimen kontrol tanpa perkuatan, dua spesimen perkuatan satu sisi (1FR-1 dan 1FR-2), dan satu spesimen perkuatan dua sisi (2FR). Teknik analisis data meliputi perhitungan tegangan geser nominal, penentuan kekakuan awal dan modulus geser *chord* melalui regresi linier pada rentang 5–33% beban puncak, serta perbandingan dengan data pengujian terdahulu (Bhat dkk., 2023). Hasil menunjukkan seluruh spesimen mengalami keruntuhan *toe crushing* pada zona tumpuan, bukan tarik diagonal ideal, sehingga tegangan geser yang diperoleh (0,311–0,494 MPa) bersifat nominal dan dikendalikan kondisi tumpuan. Urutan kapasitas antarspesimen bersifat tidak monoton, dengan spesimen dua sisi tidak menunjukkan kapasitas tertinggi, menegaskan kapasitas dikendalikan tumpuan dan bukan luas perkuatan. Modulus geser indikatif 1FR-2 (140 MPa) hanya sekitar 22% dan regangan puncaknya (0,0048) sekitar 4,8 kali lipat nilai AAC literatur, yang mengonfirmasi pengaruh *toe crushing* secara kuantitatif. Disimpulkan bahwa kontribusi FR-*Paint* terletak pada pengendalian keterbukaan retak di zona tumpuan, daripada peningkatan kapasitas geser murni.

Kata kunci: bata ringan AAC, FR-*Paint*, geser *in-plane*, tekan diagonal ASTM E519, *toe crushing*

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ABSTRACT

Autoclaved Aerated Concrete (AAC) masonry walls possess relatively low shear strength and are therefore vulnerable to in-plane shear loading during earthquakes, while the need for lightweight strengthening methods that are easily applied to existing buildings continues to grow. This study aims to evaluate the effect of surface strengthening using a fiberglass coating (FR-Paint) on the in-plane shear behavior and failure mode of AAC masonry walls, and to compare the effect of single-sided and double-sided strengthening configurations against the unstrengthened condition. The problem examined is how the in-plane shear behavior, stiffness, crack pattern, and failure mode change due to the application of FR-Paint. Testing was conducted using the diagonal compression method in accordance with ASTM E519/E519M on four specimens: one unstrengthened, two single-sided strengthened specimens (1FR-1 and 1FR-2), and one double-sided strengthened specimen (2FR). The data analysis techniques comprised computation of nominal shear stress, determination of initial stiffness and chord shear modulus through linear regression over the 5–33% peak-load range, and comparison with previous test data (Bhat et al., 2023). The results show that all specimens failed by toe crushing at the bearing zone rather than by ideal diagonal tension; thus the shear stresses obtained (0.311–0.494 MPa) are nominal and governed by the bearing condition. The capacity ranking among specimens was non-monotonic, with the double-sided specimen not exhibiting the highest capacity, confirming that capacity was governed by the bearing condition rather than the reinforcement area. The indicative shear modulus of 1FR-2 (140 MPa) was only about 22%, and its peak strain (0.0048) about 4.8 times, the literature AAC values, quantitatively confirming the influence of toe crushing. It is concluded that the contribution of FR-Paint lies in containing crack opening at the bearing zone rather than in increasing in-plane shear capacity.

Keywords: AAC masonry, FR-Paint, in-plane shear, diagonal compression ASTM E519, toe crushing