

ABSTRAK

M. Aulya Rahman: Studi Eksperimental Nilai Karakteristik Batu Bata Campuran Tanah Liat Dan Lumpur Banjir Di Kecamatan Muara Batu Aceh Utara. **Program Studi Pendidikan Vokasional Teknik Mesin FKIP Universitas Malikussaleh, 2026.**

Penelitian ini bertujuan untuk menganalisis karakteristik batu bata berbahan tanah liat dan lumpur banjir berdasarkan nilai kuat tekan dan daya serap air. Penelitian ini juga bertujuan untuk mengetahui karakteristik batu bata berdasarkan variasi persentase campuran lumpur banjir serta menilai kesesuaiannya dengan SNI 15-2094-2000.

Penelitian ini menggunakan metode kuantitatif dengan desain eksperimen. Penelitian dilaksanakan di Kecamatan Muara Batu, Kabupaten Aceh Utara untuk pengambilan lumpur banjir dan di Laboratorium Rekayasa Material & Konversi Energi Universitas Malikussaleh untuk pengujian spesimen. Benda uji terdiri atas lima variasi campuran, yaitu V1 (100% tanah liat dan 0% lumpur banjir), V2 (70% tanah liat dan 30% lumpur banjir), V3 (50% tanah liat dan 50% lumpur banjir), V4 (30% tanah liat dan 70% lumpur banjir), serta V5 (0% tanah liat dan 100% lumpur banjir). Setiap variasi terdiri atas 10 spesimen sehingga jumlah keseluruhan sebanyak 50 spesimen. Data penelitian berupa data primer yang diperoleh melalui pembuatan spesimen, pengukuran, pengujian kuat tekan, pengujian daya serap air, dan dokumentasi. Instrumen penelitian meliputi Universal Testing Machine (UTM), timbangan digital, mistar, wadah perendaman, stopwatch, dan kain lap. Data dianalisis melalui perhitungan kuat tekan dan daya serap air, penyajian data dalam tabel dan grafik, perbandingan dengan SNI 15-2094-2000, serta analisis regresi linier menggunakan Microsoft Excel.

Hasil penelitian menunjukkan bahwa nilai kuat tekan rata-rata V1, V2, V3, V4, dan V5 berturut-turut sebesar 8,11 MPa, 8,57 MPa, 7,31 MPa, 10,32 MPa, dan 9,92 MPa. Nilai kuat tekan tertinggi diperoleh V4 dengan komposisi 30% tanah liat dan 70% lumpur banjir sebesar 10,32 MPa. Seluruh variasi memenuhi nilai kuat tekan minimum Kelas 50, sedangkan V4 memenuhi nilai minimum Kelas 100. Nilai daya serap air berturut-turut sebesar 15,29%, 17,04%, 19,27%, 14,79%, dan 23,33%. Nilai terendah diperoleh V4 sebesar 14,79%, sedangkan nilai tertinggi diperoleh V5 sebesar 23,33% dan melebihi batas maksimum 20%. Berdasarkan hasil tersebut, V4 dengan komposisi 30% tanah liat dan 70% lumpur banjir menunjukkan karakteristik terbaik berdasarkan nilai kuat tekan dan daya serap air. Dengan demikian, lumpur banjir dapat dimanfaatkan sebagai bahan campuran dalam pembuatan batu bata, sedangkan penggunaan lumpur banjir 100% perlu dipertimbangkan karena nilai daya serap air melebihi batas acuan. Penelitian selanjutnya disarankan menggunakan peralatan mekanis dalam proses pencampuran, menambahkan parameter pengujian lain, serta mengendalikan proses pengeringan dan pembakaran secara lebih terukur.

Kata kunci: batu bata, tanah liat, lumpur banjir, kuat tekan, daya serap air.

ABSTRACT

M. Aulya Rahman: Experimental Study on the Characteristic Values of Bricks Made from a Mixture of Clay and Flood Silt in Muara Batu District, North Aceh. Vocational Mechanical Engineering Education Study Program, Faculty of Teacher Training and Education (FKIP), Malikussaleh University, 2026.

This study aims to analyze the characteristics of bricks made from clay and flood silt based on compressive strength and water absorption. It also aims to determine brick characteristics based on varying percentages of flood silt mixtures and to assess their compliance with SNI 15-2094-2000.

This study employed a quantitative method with an experimental design. The research was conducted in Muara Batu District, North Aceh Regency, for the collection of flood sludge, and at the Materials Engineering and Energy Conversion Laboratory of Malikussaleh University for specimen testing. The test specimens consisted of five mixture variations: V1 (100% clay and 0% flood sludge), V2 (70% clay and 30% flood sludge), V3 (50% clay and 50% flood sludge), V4 (30% clay and 70% flood sludge), and V5 (0% clay and 100% flood sludge). Each variation comprised 10 specimens, resulting in a total of 50 specimens. The research data consisted of primary data obtained through specimen preparation, measurements, compressive strength testing, water absorption testing, and documentation. Research instruments included a Universal Testing Machine (UTM), digital scale, ruler, soaking container, stopwatch, and cleaning cloth. Data analysis involved calculating compressive strength and water absorption, presenting data in tables and graphs, comparing results with the SNI 15-2094-2000 standard, and performing linear regression analysis using Microsoft Excel.

The research results indicate that the average compressive strength values for V1, V2, V3, V4, and V5 were 8.11 MPa, 8.57 MPa, 7.31 MPa, 10.32 MPa, and 9.92 MPa, respectively. The highest compressive strength was achieved by V4 composed of 30% clay and 70% flood sludge at 10.32 MPa. All variations met the minimum compressive strength requirement for Class 50, while V4 met the minimum requirement for Class 100. Water absorption values were 15.29%, 17.04%, 19.27%, 14.79%, and 23.33%, respectively. The lowest value was recorded for V4 (14.79%), whereas the highest was for V5 (23.33%), which exceeded the maximum limit of 20%. Based on these results, V4 (30% clay and 70% flood sludge) demonstrated the best characteristics regarding compressive strength and water absorption. Thus, flood sludge can be utilized as a mixture component in brick manufacturing; however, the use of 100% flood sludge requires further consideration, as the water absorption value exceeded the reference limit. Future research is recommended to employ mechanical equipment for the mixing process, include additional testing parameters, and exercise more controlled management of the drying and firing processes.

Keywords: *bricks, clay, flood silt, compressive strength, water absorption.*