ABSTRAK

ANALISIS PENGARUH PERBANDINGAN SUHU PEMBAKARAN TERHADAP STRUKTUR, KUAT TEKAN DAN DAYA SERAP GENTENG BERGLASIR KAOLIN, SERBUK SILIKA DAN ASAM BORAT

Oleh

NICO SAVERO SIRINGORINGO

Atap merupakan pelindung rangka atas suatu bangunan. Bahan penutup atap harus memenuhi persyaratan yaitu kuat, ringan, dan kedap air. Genteng merupakan salah satu penutup atap yang baik digunakan sebagai pelindung rumah tetapi masih memiliki sifat hidrofilik yang besar. Untuk mengurangi sifat hidrofilik pada genteng, saat ini telah dilakukan upaya pengembangan bahan glasir untuk melapisi genteng sehingga mengurangi sifat hidrofiliknya. Pada penelitian ini genteng dibuat dengan bahan baku lempung, tanah, dan air sedangkan bahan glasir terbuat dari campuran komposisi kaolin, serbuk silika, asam borat, dan air. Penelitian ini dilakukan dengan tujuan untuk mengetahui pengaruh variasi suhu pembakaran terhadap struktur kristal, kuat tekan, dan daya serap air genteng berglasir. Pembuatan genteng dilakukan dengan mencampurkan lempung, tanah, dan air yang kemudian dicetak dan dibakar pada suhu 900 °C. Pembuatan bahan glasir ini dilakukan dengan mencampurkan bahan baku glasir kaolin, serbuk silika, asam borat, dan air hingga menjadi suspensi dan diaplikasikan pada sampel genteng dengan metode celup yang kemudian dibakar pada variasi suhu 1050 °C, 1100 °C, dan 1200 °C. Hasil analisis struktur kristal diketahui terdapat fasa quartz, nacrite, halloysite, tridymite, cristobalite high, dickite, sassolite, quartz, pyrophyllite, clinometaborite, cristobalite, dan dickite pada sampel. Nilai kuat tekan terbesar adalah sampel genteng sebelum dilakukan pengglasiran dan nilai daya serap air terbaik adalah sampel genteng glasir dengan pembakaran suhu 1200 °C. Dalam konteks penelitian ini, variasi suhu pembakaran genteng berglasir memiliki pengaruh terhadap fasa genteng, yang pada gilirannya mempengaruhi sifat-sifat mekanik seperti kuat tekan dan daya serap air.

Kata kunci: atap, daya serap, glasir, kuat tekan, suhu pembakaran.

ABSTRACT

ANALYSIS OF THE INFLUENCE OF FIRING TEMPERATURE VARIATION ON THE STRUCTURE, COMPRESSIVE STRENGTH, AND WATER ABSORPTION OF GLAZED ROOF TILES MADE OF KAOLIN, SILICA POWDER, AND BORIC ACID

By

NICO SAVERO SIRINGORINGO

Roof serves as the protective framework of a building. Roofing materials must meet specific requirements, such as strength, lightweight, and waterproofness. Tile is one of the preferred roofing materials due to its effectiveness in shielding houses, despite having high hydrophilic properties. To mitigate the hydrophilic nature of tiles, efforts have been made to develop glazing materials for tile coating, aiming to reduce its hydrophilicity. In this research, tiles were manufactured using clay, soil, and water as raw materials, while the glazing material consisted of a mixture of kaolin, silica powder, boric acid, and water. The study aimed to investigate the influence of varying firing temperatures on the crystal structure, compressive strength, and water absorption of glazed tiles. The tile production process involved mixing clay, soil, and water, followed by molding and firing at 900°C. The glazing material was prepared by combining kaolin, silica powder, boric acid, and water to form a suspension, which was then applied to the tile samples using a dipping method and fired at different temperatures of 1050°C, 1100°C, and 1200°C. Crystal structure analysis revealed the presence of various phases, including quartz, nacrite, halloysite, tridymite, cristobalite high, dickite, sassolite, pyrophyllite, clinometaborite, cristobalite, and dickite in the tile samples. The highest compressive strength was observed in unglazed tile samples, while the best water absorption performance was exhibited by the glazed tile samples fired at 1200°C. In the context of this research, the variation in firing temperatures for glazed tiles had an impact on the tile phases, subsequently influencing mechanical properties such as compressive strength and water absorption.

Keywords: roof, water absorption, glaze, compressive strength, firing temperature.