ABSTRACT

This research investigates the compressive strength and water absorption characteristics of paving blocks incorporating palm oil boiler ash as a partial cement replacement. The use of boiler ash waste aligns with sustainable waste management practices and has potential as an alternative material in construction. The study was carried out at the Faculty of Agrotechnology, Prima Indonesia University, Medan, during May–June 2025. The experimental method was applied in a laboratory setting, with boiler ash added at proportions of 5%, 10%, and 15% of the cement weight, using a cement-to-sand ratio of 1:3. Tests were conducted on physical properties (appearance and dimensions) and mechanical properties (compressive strength and water absorption) in accordance with SNI 03-0691-1996 standards.The findings reveal that the 10% boiler ash mixture achieved the highest compressive strength, reaching 21.22 MPa, which satisfies the requirements for SNI Quality B (≥20 MPa) for parking applications. However, its water absorption rate of 7.30% met only the Quality C criteria (maximum 8%). Both the 5% and 15% mixtures achieved compressive strengths of 17.61 MPa, meeting Quality C standards (≥15 MPa). The 5% mixture's water absorption of 8.20% corresponded to Quality D (maximum 10%), classifying it accordingly. Conversely, the 15% mixture demonstrated the best water absorption performance at 6.10%, meeting Quality C standards.In conclusion, incorporating palm oil boiler ash in paving block production can result in products meeting SNI 03-0691-1996 specifications for Quality C (pedestrian pathways) and Quality D (gardens and similar applications). Utilizing this waste not only supports environmental sustainability but also offers a cost-effective building material option.

***Keywords**: palm oil boiler ash, paving block, compressive strength, water absorption, SNI 03-0691-1996.*