

Strength, density and water absorption of Palm oil boiler ash (POBA) geopolymer brick/IBS brick

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Abstract. Geopolymer or alkali-activated binder is produced by synthesizing aluminosilicate source materials with an alkaline activator solution. This study has been conducted to produce palm oil boiler ash (POBA) geopolymer brick/IBS brick by using geopolymerisation method. Mix design of geopolymer brick/IBS brick was produced using NaOH concentration, ratio of S/L, ratio $\text{Na}_2\text{SiO}_3/\text{NaOH}$ and curing temperature of 14 M, 1.5, 2.5 and 80 °C. The ratio of POBA-to-sand for geopolymer brick/IBS brick for this study was 1:3. The properties of geopolymer brick/IBS brick were analyzed in term of compressive strength, water absorption and density at different aging period, which is 1st, 3rd, 7th, 28th and 60th days. The result showed that the geopolymer brick produced using POBA, showed an increment in strength with times where the maximum strength obtained was up to 16.1 MPa (60th days). The density of this brick was in the range 1615 kg/m³ to 1750 kg/m³ and can be classified into medium weight for non-loading brick according to ASTM C129 (2013). As for the water absorption, the range was 6.8% to 12.2%, which is less than limit (17%) of ASTM C90 (2013) specification. For geopolymer IBS brick, the maximum compressive strength at 60th days was 14.3 MPa. There are slightly different strength of geopolymer IBS brick, which is due to the existence of tongue and groove on the surface of IBS brick thus leads to lower strength. The geopolymer IBS brick was classified as medium weight brick according to ASTM C129 (2013) with density a in the range 1792 kg/m³ to 1894 kg/m³ and water absorption 8.7% to 14.5%.

Keywords: Density, Geopolymer, IBS Brick, Palm Oil Boiler Ash, Strength, Water Absorption