

Assessment of technological performance of extruded earth block by adding bottom biomass ashes

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Abstract

The search for more sustainable construction materials has led researchers to reconsider ancient techniques, such as earth-based construction materials (EBCMs). These have been lately highlighted as a feasible way of reducing environmental footprint and improving building performance. EBCMs are commonly divided into monolithic and brickworks solutions but these last are specially promoted due to the advantage of automation techniques which contribute to guarantee constant quality and economical production. However, hygroscopic and mechanical behavior have been constantly pointed out as major barriers for extending their use. The addition of fibres and/or polymers incorporation or the stabilization by means of cement or alkali activation, among others, have tried to face this issue but environmental and economic impacts have frequently called into question these findings. Thus, with the aim of developing a feasible and environmental friendly EBCMs, this paper assesses the impact of manufacturing EBCMs by replacing up to 20 % of soil with biomass bottom ashes (BBA). Industrial procedures were followed for developing samples which were not stabilized by any additive. It has been concluded that the addition of BBA barely influences mechanical properties which range from 2.5 MPa to 3.8 MPa. Conversely, thermal conductivity and density are slightly reduced which leads to lighter materials and higher insulation values. Besides, specific heat is slightly increased which may improve overall building energy performance. Finally, it has been demonstrated that water resistance and toxicity comply with mandatory threshold values.

Author keywords

Bottom Ash
Earth
Strength
Thermal insulation
Water resistance