ABSTRACT

This investigation explores the development of a non-flammable and lightweight construction material specifically tailored for safety structures in the firework industry, using Autoclaved Aerated Concrete (AAC) blocks reinforced with basalt fiber. Given the highly flammable and hazardous nature of firework manufacturing and storage, there is a critical need for construction materials that combine fire resistance, structural integrity, and reduced weight. AAC blocks are well-known for their thermal insulation, fire resistance, and lightweight properties, while basalt fiber, a high-performance, eco-friendly material, offers excellent tensile strength and fire resistance. In this study, basalt fiber was integrated into AAC block matrices in varying proportions to assess improvements in mechanical strength and thermal stability without compromising weight efficiency. The experimental analysis focused on parameters such as compressive strength, density, thermal conductivity, and fire resistance under controlled conditions. The results demonstrated that basalt fiber significantly enhances the mechanical properties and fire resistance of AAC blocks, making the composite material an ideal candidate for construction in fire-prone industrial settings. This research contributes to the development of safer and more sustainable infrastructure in the firework industry.

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