IOP Conf. Series: Earth and Environmental Science **1530** (2025) 012026 doi:10.1088/1755-1315/1530/1/012026

Assessing the Influence of EAFS on Alkali Activated Mortar: Mechanical Properties, Chloride Penetration, and Elevated Temperatures

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Abstract. With the increasing focus on sustainable practices and environmentally friendly solutions, the construction industry has made significant progress utilizing electric arc furnace slag (EAFS) in construction materials. This shift has been primarily driven by the need to reduce the negative impacts of traditional cement production on the environment, as well as the high costs associated with conventional construction materials. Through the innovative use of EAFS as both a binder and fine aggregate, alkali-activated mortar (AAM) has emerged as a promising alternative to traditional cement mortar. In this study, various tests were conducted to examine the performance of AAM, including compressive strength, rapid chloride penetration, and resistance to elevated temperatures. The results of the study showcased the remarkable strength and durability of AAM, making it a clear standout in comparison to traditional cement mortars. With a compressive strength of 35.8 MPa and a moderate level of chloride penetration, AAM proves to be a highly effective solution in construction projects. Additionally, the fact that it only experiences a minimal 11% strength loss when exposed to extreme temperatures of 800 degrees Celsius for 2 hours is a testament to its resilience and potential for use in high-temperature environments.

Keywords: Alkali activated mortar, Electric Arc Furnace Slag, Slag fine Aggregate, RCPT of Electric Arc Furnace Binder