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Influence of additives on the structural performance of cement-stabilised rammed earth

## Influence of additives on the structural performance of cement-stabilised rammed earth

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### Abstract

The influence of additives on the structural behaviour of cement-stabilised rammed earth was investigated through an experimental programme based on 13 different mixes with varying cement contents (6, 8 and 10% by earth weight) and three different types of additives (superplasticiser, air-entraining agent (AEA) and hardening accelerator). In total, 156 specimens were fabricated and tested at 7 and 28 days in order to compare their compressive strength and other properties such as stress–strain relationships, shrinkage and workability. The results highlighted the essential role of cement in increasing the compressive strength of the material. Specifically, cement contents of 6%, 8% and 10% corresponded, respectively, to strength increases of 41%, 80% and 92% compared with the reference mix with a mean compressive strength of 1.15 MPa. The AEA was found to be the most effective additive for increasing the compressive strength, with obtained strengths of up to 2.93 MPa (an increase of 155% compared with the reference mix). The efficiency of each mix was evaluated through a strength/cost ratio. In addition, an overall comparison of compressive strength, shrinkage, deformation, cost and workability was performed using an analytic hierarchy process. Finally, the experimental results were compared with the mechanical requirements of various codes.

Keywords: [buildings](#), [structures & design codes of practice & standards](#) [strength & testing of materials](#)

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