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# Alkali-silica reaction in cement mortars containing glass particles

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## Abstract

The work deals with the possibility of using glass in concrete and summarizes its possible negative effects from the point of view of corrosion in concrete. The critical mechanism that occurs on the interface between the glass grain and the cement matrix is the formation of an expansive alkali-silica gel. Alkali-silica gel is hygroscopic and by further absorption of water into its structure, it creates tension strength in the hardened material, which can lead to its failure. The aim of this work was to investigate the effect of glass shards on the alkali-silica reaction (ASR) in mortars. ASR was measured and evaluated according to the accelerated dilatometric test ASTM 1260. It was found that the fine fraction of glass (63-125 $\mu$ m) has positive effect on ASR mitigation, while the coarse fraction of glass (2-4mm) promotes the formation of ASR due to the easy dissolution of glass in a low pH environment. This statement was subsequently supported by electron microscope (SEM) images, where cracks through the glass grains and the binder phase were observed on samples with a coarse glass fraction. Furthermore, it was found, the higher amount of coarse glass fraction is presented in the sample, the higher formation of ASR was observed.

**Keywords:** Waste glass, Mortar, Alkali silica reaction, Cement

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