

# Using Class C Fly Ash to Mitigate Alkali–Silica Reactions in Concrete

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## ABSTRACT

High-calcium fly ashes, classified as Class C by the ASTM International (ASTM) C618 definition, are often excluded as a means to mitigate alkali–silica reactions (ASR) in concrete because of a relationship between high calcium content and expansion. It is generally true that low replacement levels (<15%) of Class C fly ash may not offer ASR mitigation; however, it has been demonstrated that Class C fly ashes can mitigate the effects of ASR at higher replacement levels than specified. In some cases, the amount of Class C fly ash needed to control ASR may even exceed specification limits set by state Departments of Transportation.

The University of North Dakota Energy & Environmental Research Center (EERC) is performing a multiyear investigation to evaluate the performance of several Class C fly ashes (>10% CaO) using existing predictive ASR test methods. ASTM standard methods will be applied to fly ash samples and cast specimens produced using varying levels of Class C fly ashes. In addition to these empirical tests, the EERC will evaluate specimens using advanced electron microscopy techniques to look at the mineralogy of the ash and the aggregates and, especially, the reaction products. It is anticipated that results will confirm limited unpublished work that indicates the efficacy of using higher percentages of Class C fly ash to mitigate ASR when using moderately reactive aggregates.

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