

Evaluation of effectiveness of supplementary cementitious materials in suppressing AAR-induced expansion in concrete structures

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It has been known in the past 4-5 decades that the damaging effects of alkali-aggregate reaction (AAR) can be suppressed by incorporating appropriate amounts of some supplementary cementitious materials (SCMs) in concrete. The effectiveness of SCMs in suppressing AAR-induced expansion of concrete can be assessed through concrete prism tests (CPT). This test takes 1-2 years which is too long for practical purposes.

To reduce the evaluation period, around 30 years ago, the first author used accelerated mortar bar testing (AMBT, 1M NaOH, 80°C), using a few Australian aggregates and SCMs. The author also successfully used this approach in other studies of different SCMs and aggregates from other Australian sources.

However, as the degree of reactivity of aggregates, and the efficacy of SCMs in suppressing AAR are variable, it may be possible to use different amounts of the same SCMs for different aggregates and for different assessment period.

To investigate this possibility, three aggregates of different reactivity levels were used in combination with different dosages of three SCMs in the CPT and AMBT for various test periods. This paper discusses the results of these tests and shows that a universal dosage of each SCMs and testing period cannot be prescribed for all aggregates, and that each needs to be tested individually.