

## ABSTRACT

# Alkali Silica Reaction Criteria for Accelerated Mortar Bar Tests Based on Field Performance Data

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## ABSTRACT

Supplementary cementitious materials (SCM) coupled with low alkali cement are used in concrete to mitigate alkali silica reactivity (ASR) in Department of Defense (DOD) concrete airfield pavements. Current DOD specifications used to limit the expansion of 14-day accelerated mortar bar test (AMBT) results to 0.08%, but in January 2008 this was changed to 0.08% after 28-days of exposure. While this more conservative approach further insures the prevention of ASR, it places significant constraints on aggregate supplies, and could result in unwarranted expenses if it unnecessarily requires alternate aggregates to be transported from distant sources. Since the adoption of the 0.08% limit, additional research has been performed based on existing extended studies of field concrete pavement slabs, along with AMBT tests (14-day as well as 28-day AMBT) and 2-year concrete prism tests (CPT), suggesting that this limit can be modified, at least for concrete not exposed to deicers. An analysis of this data has been performed and cited supporting a reduced limit for 14-day AMBT expansion of 0.06% and an increase of the 28-day AMBT expansion to 0.13%. A minimization process was employed to minimize false negative and false positive AMBT test results when compared to the field performance of the experimental concrete pavement slabs. This analysis clearly suggests that a reduced 14-day AMBT limit of 0.06% or a 28-day AMBT limit of 0.13% is justifiable and are equally as efficient for mitigating ASR (based on the available data), and would reduce costs by allowing the use of more local aggregates. The 2-year CPT is not recommended for evaluating ASR because of the number of false negatives and false positives associated with this test method when compared to the field performance of the concrete slabs, and due to the lengthy testing time and uncertainties associated with this test. The 14-day or 28-day AMBT provide much more timely results than the 2-year CPT. Recommendations are made for further

studies and predictive model development of 14-day and 28-day AMBT test data using fly ash, and the use of class C fly ash.

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