
Standard Method of Test for Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali–Silica Reaction

AASHTO Designation: T 303-22¹

Technically Revised: 2022

Technical Subcommittee: 1c, Aggregates



**American Association of State Highway and Transportation Officials
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1. SCOPE

- 1.1. This test method allows detection within 16 days of the potential for deleterious expansion of mortar bars due to the alkali-silica reaction.
- 1.2. *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this procedure to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to its use.* A specific precautionary statement is given in Note 4.
- 1.3. The values stated in SI units are to be regarded as standard. The values in inch-pound units are shown in parentheses, and are for informational purposes only.
- 1.4. *The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of R 18 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with R 18 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of R 18 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.*

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
 - M 85, Portland Cement
 - M 201, Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes
 - M 339M/M 339, Thermometers Used in the Testing of Construction Materials
 - R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
 - R 70M/R 70, Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete
 - T 106M/T 106, Compressive Strength of Hydraulic Cement Mortar (Using 50-mm or 2-in. Cube Specimens)

- T 162, Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency

2.2.

ASTM Standards:

- C295/C295M, Standard Guide for Petrographic Examination of Aggregates for Concrete
- C670, Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- C856/C856M, Standard Practice for Petrographic Examination of Hardened Concrete
- D1193, Standard Specification for Reagent Water
- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
- E11, Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
- E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
- E2877, Standard Guide for Digital Contact Thermometers

2.3.

International Electrotechnical Commission Standard:

- IEC 60584-1:2013, Thermocouples - Part 1: EMF Specifications and Tolerances

2.4.

Other Documents:

- Davies, G. and R. E. Oberholster. Use of the NBRI Accelerated Test to Evaluate the Effectiveness of Mineral Admixtures in Preventing the Alkali-Silica Reaction. *Cement and Concrete Research*, Vol. 17, 1987a, pp. 97–107.
- Davies, G. and R. E. Oberholster. An Interlaboratory Programme on the NBRI Accelerated Test to Determine the Alkali-Reactivity of Aggregates. *National Building Research Institute, CSIRO, Special Report BOU 92-1987*, Pretoria, RSA, 1987b, pp. 16.
- Hooton, R. D. and C. A. Rogers. Evaluation of Rapid Test Methods for Detecting Alkali-Reactive Aggregates. *Proc., Eighth International Conference on Alkali-Aggregate Reaction*, Kyoto, 1989, pp. 439–444.
- Oberholster, R. E. and G. Davies. An Accelerated Method for Testing the Potential Alkali Reactivity of Siliceous Aggregates. *Cement and Concrete Research*, Vol. 16, 1986, pp. 181–189.

3. SIGNIFICANCE AND USE

- 3.1. This test method provides a means of detecting the potential of an aggregate used in concrete for undergoing alkali-silica reaction and resulting in potentially deleterious internal expansion. It is based on the NBRI accelerated test method (Davies and Oberholster, 1987a and 1987b; Hooton and Rogers, 1989; and Oberholster and Davies, 1986).
- 3.2. When expansions greater than 0.10 percent are developed within 16 days from casting, it is recommended that supplementary information be developed to confirm that the expansion is actually due to alkali reactivity. Sources of such supplementary information include: (1) petrographic examination of the aggregate by ASTM C295/C295M to determine if known reactive constituents are present; and (2) examination of the specimens after tests by ASTM C856/C856M to identify the products of alkali reactivity.
- 3.3. When it has been concluded from the results of tests performed using this test method and supplementary information that a given aggregate should be considered potentially deleteriously reactive, additional studies, using alternative methods, may be appropriate to develop further information on the potential reactivity.