Standard Method of Test for

Rapid Identification of Alkali-Silica Reaction Products in Concrete

AASHTO Designation: T 299-93 (2004)

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1. SCOPE

1.1. This test covers the rapid visual detection of the products of alkali-silica reaction (ASR) in portland cement concrete.

1.2. The values stated in SI units are to be regarded as standard.

1.3. *This test involves hazardous materials, operations, and equipment. It does not purport to address all of the safety problems with its use. It is the responsibility of the user of this test to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to its use.*

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- M 231, Weighing Devices Used in the Testing of Materials
- T 198, Splitting Tensile Strength of Cylindrical Concrete Specimens

3. SIGNIFICANCE AND USE

3.1. This test covers the identification of alkali-silica reaction products in concrete samples by means of visual observation. Test results have shown that the products formed by the reaction of alkalis and a wide variety of reactive aggregates can be identified by this method. The amount and location of the products are indicators of the development of alkali-silica reaction in the concrete sample tested. This test is not meant to be used to detect the products of alkali-carbonate reaction in concrete.

3.2. This test is intended to be used as one in a series of tests to diagnose alakali-silica reaction in a concrete structure. The results of this test will help to confirm or deny the presence of alakali-silica reaction products in the concrete structure under investigation.

3.3. Sodium present in concrete can react with the reagent in this test to form a product that fluoresces with a greenish-yellow color and which can interfere with the interpretation of the results. However, sodium is dispersed rather uniformly in the hydrated cement matrix in concrete whereas the alkali-silica reaction products are formed particularly in and around the aggregate particles. Interference by sodium from the de-icing salts or seawater can be minimized by rinsing the test surface.

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3.4. Care should be taken in interpreting the results of this test when it is used on concrete surfaces subjected to wearing, erosion, and abrasion, because these processes may remove reaction products and, therefore, the absence of reaction products may not be indicative of the development of the reaction in the interior of the concrete. Care should also be taken in interpreting the results for concrete showing carbonation or containing fly ash or silica fume. Both fly ash and silica fume can react with alkalies in concrete to produce reaction products similar to those produced by ASR. The extremely fine nature and dispersion of fly ash and silica fume, however, result in a product that is well dispersed. The fluorescence of such products is generally faint and uniform, but may be influenced by the dispersion of fly ash and silica fume.

4. APPARATUS, REAGENTS, AND MATERIALS

4.1. *Specimen Conditioning Apparatus*:

4.1.1. Plastic beaker—500-mL capacity.

4.1.2. Plastic squeeze bottle (for water)—250-mL capacity.

4.1.3. Disposable polyethylene gloves.

4.1.4. Protective clothing (lab coat).

4.1.5. Absorbent paper towels.

4.1.6. Enclosed space for spraying reagent application.

Note 1—A fume hood, glove box, or disposable glove bags have been found to be suitable for this purpose.

4.2. *Specimen Treatment Apparatus*:

4.2.1. Medicine dropper for applying reagent.

4.2.2. Sprayer for water—A small, hand-held sprayer for spraying tap water.

4.3. *Reagent (Uranyl Acetate Solution)*:

4.3.1. Acetic acid solution (1N).

4.3.2. Glass boiling flask—250-mL capacity.

4.3.3. Two polyethylene storage bottles with tight-fitting cap—100-mL capacity.

4.3.4. Polyethylene volumetric flask—100-mL capacity.

4.3.5. Uranyl acetate powder (ACS reagent grade).

4.3.6. The balance shall have sufficient capacity and conform to M 231, Class G 1.

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