



Designation: C441 – 05

# Standard Test Method for Effectiveness of Pozzolans or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to the Alkali-Silica Reaction<sup>1</sup>

This standard is issued under the fixed designation C441; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers the determination of the effectiveness of pozzolans or slag in preventing the excessive expansion caused by reaction between aggregates and alkalis in portland cement mixtures. The evaluation is based on the expansion developed in mortar bars by a combination of portland cement and a pozzolan or slag, made with reactive aggregates (borosilicate glass), during storage under prescribed conditions of test.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

[C125 Terminology Relating to Concrete and Concrete Aggregates](#)

[C150 Specification for Portland Cement](#)

[C227 Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations \(Mortar-Bar Method\)](#)

[C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete](#)

[C989 Specification for Slag Cement for Use in Concrete and Mortars](#)

[C1240 Specification for Silica Fume Used in Cementitious Mixtures](#)

[C1437 Test Method for Flow of Hydraulic Cement Mortar](#)

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.26 on Chemical Reactions.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

## 3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology [C125](#).

## 4. Significance and Use

4.1 This test method may be used as a preliminary or screening test to evaluate the relative effectiveness of a number of different materials being considered for use to prevent excessive expansion due to alkali-silica reaction.

4.2 This test method may also be used to evaluate materials proposed for use on a particular job to prevent excessive expansion due to alkali-silica reaction, by testing in the quantity and in combination with the cement or cements to be used on the job.

4.3 This test method does not assess the suitability of pozzolans or slag for use in concrete. These materials should comply with Specification [C618](#), Specification [C989](#) or Specification [C1240](#).

## 5. Apparatus

5.1 The apparatus shall be as described in Test Method [C227](#).

## 6. Materials

6.1 *Borosilicate Glass*<sup>3</sup> —Borosilicate glass granules graded according to [Table 1](#) or crushed Pyrex Glass No. 7740 cullet or solid glass rod crushed and graded according to [Table 1](#). After the glass cullet or rod has been crushed and separated into the various sieve sizes, wash with a water spray over the sieve to remove adhering dust and fine particles from the aggregate. Dry the portions retained on the various sieves and, unless used immediately, store each such portion individually in a clean container provided with a tight-fitting cover.

<sup>3</sup> The sole source of supply of borosilicate glass granules in the specific sizes called for in this test method known to the committee at this time is Enviroglass International, Caldwell, ID, <http://www.enviroglass.net/>. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,<sup>1</sup> which you may attend.