



Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)¹

This standard is issued under the fixed designation C227; 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 (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This test method covers the determination of the susceptibility of cement-aggregate combinations to expansive reactions involving hydroxyl ions associated with the alkalis (sodium and potassium) by measurement of the increase (or decrease) in length of mortar bars containing the combination during storage under prescribed conditions of test.

1.2 Alkalis participating in the expansive reactions usually are derived from the cement; under some circumstances they may be derived from other constituents of the concrete or from external sources. Two types of alkali reactivity of aggregates are recognized: (1) an alkali-silica reaction involving certain siliceous rocks, minerals, and natural or artificial glasses and (2) an alkali-carbonate reaction involving dolomite in certain calcitic dolomites and dolomitic limestones (see Descriptive Nomenclature C294). The method is not recommended as a means to detect the latter reaction because expansions produced in the mortar-bar test by the alkali-carbonate reaction (see Test Method C586) are generally much less than those produced by the alkali-silica reaction for combinations having equally harmful effects in service.

1.3 The values stated in SI units are to be regarded as standard. When combined standards are cited, the selection of measurement system is at the user's discretion subject to the requirements of the referenced standard.

1.4 *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.*

¹ 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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2. Referenced Documents

2.1 ASTM Standards:²

- C33 Specification for Concrete Aggregates
- C109/C109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
- C289 Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)
- C294 Descriptive Nomenclature for Constituents of Concrete Aggregates
- C295 Guide for Petrographic Examination of Aggregates for Concrete
- C305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency
- C441 Test Method for Effectiveness of Pozzolans or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to the Alkali-Silica Reaction
- C490 Practice for Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete
- C511 Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes
- C586 Test Method for Potential Alkali Reactivity of Carbonate Rocks as Concrete Aggregates (Rock-Cylinder Method)
- C856 Practice for Petrographic Examination of Hardened Concrete
- C1437 Test Method for Flow of Hydraulic Cement Mortar
- E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.