



Standard Test Method for Length Change of Concrete Due to Alkali-Carbonate Rock Reaction¹

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1. Scope

1.1 This test method covers the determination, by measurement of length change of concrete prisms, the susceptibility of cement-aggregate combinations to expansive alkali-carbonate reaction involving hydroxide ions associated with alkalies (sodium and potassium) and certain calcitic dolomites and dolomitic limestones.

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

1.3 *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:

- C 33 Specification for Concrete Aggregates²
- C 125 Terminology Relating to Concrete and Concrete Aggregates²
- C 150 Specification for Portland Cement³
- C 157 Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete²
- C 233 Test Method for Testing Air-Entraining Admixtures for Concrete²
- C 294 Descriptive Nomenclature of Constituents of Natural Mineral Aggregates²
- C 295 Guide for Petrographic Examination of Aggregates for Concrete²
- C 490 Practice for Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete³
- C 511 Specification for Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes³
- C 586 Test Method for Potential Alkali Reactivity of Car-

bonate Rocks for Concrete Aggregates (Rock Cylinder Method)²

C 595 Specification for Blended Hydraulic Cements³

C 670 Practice for Preparing Precision Statements for Test Methods for Construction Materials²

C 702 Practice for Reducing Field Samples of Aggregate to Testing Size²

D 75 Practice for Sampling Aggregates⁴

3. Terminology

3.1 Terminology used in this standard is defined in Terminology C 125 or Descriptive Nomenclature C 294.

4. Significance and Use

4.1 Two types of alkali reactivity of aggregates have been described in the literature: the alkali-silica reaction involving certain siliceous rocks, minerals, and artificial glasses **(1)**,⁵ and the alkali-carbonate reaction involving dolomite in certain calcitic dolomites and dolomitic limestones **(2)**. This test method is not recommended as a means to detect combinations susceptible to expansion due to alkali-silica reaction since it was not evaluated for this use in the work reported by Buck **(2)**. This test method is not applicable to aggregates that do not contain or consist of carbonate rock (see Descriptive Nomenclature C 294).

4.2 This test method is intended for evaluating the behavior of specific combinations of concrete-making materials to be used in the work. However, provisions are made for the use of substitute materials when required. This test method assesses the potential for expansion of concrete caused by alkali-carbonate rock reaction from tests performed under prescribed laboratory curing conditions that will probably differ from field conditions. Thus, actual field performance will not be duplicated due to differences in wetting and drying, temperature, other factors, or combinations of these (see Appendix X1).

4.3 Use of this test method is of particular value when samples of aggregate from a source have been determined to contain constituents that are regarded as capable of participation in a potentially deleterious alkali-carbonate rock reaction

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 *Annual Book of ASTM Standards*, Vol 04.02.

³ *Annual Book of ASTM Standards*, Vol 04.01.

⁴ *Annual Book of ASTM Standards*, Vol 04.03.

⁵ The boldface numbers in parentheses refer to the list of references at the end of this test method.