



Standard Test Method for Potential Expansion of Aggregates from Hydration Reactions¹

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1. Scope

1.1 This test method covers the determination of potential volume expansion of dense graded compacted aggregates that contain components susceptible to hydration and consequent volume increase, such as the free calcium and magnesium oxides that occur in some industrial by-products.

1.2 The values stated in SI units are to be regarded as the standard. The inch-pound units in parentheses are for information purposes only.

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 702 Practice for Reducing Samples of Aggregate to Testing Size²

D 75 Practice for Sampling Aggregates^{2,3}

D 698 Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort (600 kN-m/m³(12,400 ft-lbf/ft³))⁴

D 1883 Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils⁴

D 2940 Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports³

3. Summary of Test Method

3.1 This test method consists of measuring the volume expansion of compacted specimens following the general procedures of Test Method D 1883. Compaction is based on maximum density determination using Test Methods D 698. To accelerate the hydration reaction, specimens are stored in water at $70 \pm 3^\circ\text{C}$ ($158 \pm 5^\circ\text{F}$) for a minimum of 7 days.

¹ This test method is under the jurisdiction of ASTM Committee D-4 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.51 on Aggregate Tests.

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² *Annual Book of ASTM Standards*, Vol 04.02.

³ *Annual Book of ASTM Standards*, Vol 04.03.

⁴ *Annual Book of ASTM Standards*, Vol 04.08.

4. Significance and Use

4.1 This test method provides a procedure for determining the compliance of steel slags and other materials with specifications, such as Specification D 2940, that limit permissible expansion of base and subbase aggregates containing components subject to hydration.

4.2 This test method can also be used to evaluate the effectiveness of aging or other treatments for reducing the expansive potential of such materials.

4.3 Test results have not been correlated with field performance, and values obtained do not necessarily indicate expansion that may occur in service conditions.

5. Apparatus

5.1 *Molds, Spacer Disks, Expansion Measuring Apparatus, Stainless Steel Weights, and Dial Gages* conforming to the requirements of Test Method D 1883.

5.2 *Mixing Bowl, Straight-Edge, Scale, Filter Paper, Dishes*, etc. as required in Test Methods D 698 and D 1883.

5.3 *Water Storage Facility*—A water bath controlled at $70 \pm 3^\circ\text{C}$ ($158 \pm 5^\circ\text{F}$) or suitable tanks or buckets for submersion of the test specimens in an oven controlled so as to maintain that water temperature.

6. Sampling

6.1 To determine compliance with specifications, take field samples in accordance with Practice D 75 or the requirements of the project specifications.

6.2 Take samples for research or general evaluation purposes in a manner appropriate for the materials and purposes involved.

6.3 Keep samples at field moisture content until the time of the test by sealing in water-tight containers or plastic bags.

7. Preparation of Sample

7.1 Reduce the field sample to testing size in accordance with Practice C 702, obtaining two 18-kg (40-lb) portions.

7.2 Pass the samples through the 19.0-mm ($\frac{3}{4}$ -in.) and 4.75-mm (No. 4) sieves. If 10 % or more is retained on the 19.0-mm ($\frac{3}{4}$ -in.) sieve proceed to 7.2.1 for oversize correction.

7.2.1 Pass the material through a 75-mm (3-in.) sieve. Discard the material retained on the 75-mm (3-in.) sieve. The material passing the 75-mm (3-in.) sieve and retained on the