



Standard Test Method for Expansion or Contraction of Coal by the Sole-Heated Oven¹

This standard is issued under the fixed designation D2014; 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.

1. Scope

1.1 This test method covers a large-scale laboratory test for obtaining information on the expansion or contraction of coal or coal blends during carbonization under specified conditions. This test method is applicable in the examination of coals or coal blends intended for use in the manufacture of coke.

1.2 The values stated in SI units shall be regarded as standard. Inch-pound units shall be accepted on an equivalent basis.

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:*²

D2013 [Practice for Preparing Coal Samples for Analysis D2234/D2234M Practice for Collection of a Gross Sample of Coal](#)

D3302 [Test Method for Total Moisture in Coal](#)

E11 [Specification for Woven Wire Test Sieve Cloth and Test Sieves](#)

3. Summary of Test Method

3.1 During the test, a measured thickness of coal about 102 mm (4 in.) is heated from the bottom surface while a force corresponding to 15.2 kPa (2.20 psi) is applied to the top surface through a piston. At the end of the test, the thickness of the coke is measured by observing the final position of the piston.

4. Significance and Use

4.1 The values determined in this test method indicate to what extent a given coal or coal blend will expand or contract

during the carbonization process when evaluated in terms of pertinent experience with other coals and coal blends and processing conditions used in commercial-type coke ovens.

5. Apparatus

5.1 *Test Oven Assembly*, consisting of the following: either a single-chamber oven having approximately 280-mm (11-in.) width, 610-mm (24-in.) length, and 280-mm depth, or a double-chambered oven with two chambers each having approximately 280-mm width, length, and depth; a heating system to heat the charge(s) unidirectionally through the sole according to a controlled program; piston(s) arranged so that a constant load may be applied to the top surface of the charge; and suitable instrumentation so that appropriate temperatures and the position of the piston(s) may be measured. The auxiliary equipment includes apparatus facilitating the charging of the oven in a standard manner. The vertical partition of the double-chambered oven may be of 2-in. (51-mm) firebrick tile or equivalent.

5.1.1 Carbonization Chamber:

5.1.1.1 The sole shall be of silicon carbide tile, about 40 mm (1.5 in.) thick, 305 mm (12 in.) wide, and extending approximately 75 mm (3 in.) beyond the carbonization chamber at the front and back. Side, front, and back walls should be 40-mm firebrick tile or equivalent. It is appropriate to key the sole to the side and back tiles. The top edges of sidewalls shall be held in an adjustable steel framework so that the walls may be made and maintained precisely perpendicular to the sole. Hole(s) 6.35 mm (0.25 in.) in diameter shall be provided through the side of the oven to enable the placement of thermocouple(s) on the top surface of the sole in the center of the oven chamber(s).

5.1.1.2 In constructing the oven, the sides and ends of the carbonization chamber shall be surrounded with at least 200 mm (8 in.) of insulating refractories and the whole assembly encased in a suitable restraining structure of steel shapes and plates designed to provide dimensional stability.

5.1.2 Sole-Heating System:

5.1.2.1 The heating system shall consist of a group of electrical heating elements mounted under the silicon carbide sole and suitable equipment to provide automatic control. Heating elements may be either silicon carbide-type resistance elements or coils of heating wire enclosed in silica tubes. Elements shall be arranged to obtain minimum variation of temperature over the area of the sole. It is desirable to

¹ This test method is under the jurisdiction of ASTM Committee D05 on Coal and Coke and is the direct responsibility of Subcommittee D05.15 on Metallurgical Properties of Coal and Coke.

Current edition approved May 1, 2010. Published May 2010. Originally approved in 1962. Last previous edition approved in 2004 as D2014 – 97 (2004). DOI: 10.1520/D2014-97R10.

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.