



Designation: C 202 – 93 (Reapproved 2004)

Standard Test Method for Thermal Conductivity of Refractory Brick¹

This standard is issued under the fixed designation C 202; 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 supplements Test Method C 201 and shall be used in conjunction with that test method to determine the thermal conductivity of refractory brick with the exception of insulating firebrick (use Test Method C 182), and carbon refractories. This test method is designed for refractories having a conductivity factor of not more than 200 Btu·in./h·ft²·°F (28.8 W/m·K).

1.2 The values stated in inch-pound units are to be regarded as the standard. The values in parentheses are provided for information 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:*²

C 155 Classification of Insulating Firebrick

C 182 Test Method for Thermal Conductivity of Insulating Firebrick

C 201 Test Method for Thermal Conductivity of Refractories

E 220 Method for Calibration of Thermocouples by Comparison Techniques

3. Significance and Use

3.1 The thermal conductivity of refractory brick is a property required for selecting their thermal transmission characteristics. Users select refractory brick to provide specified conditions of heat loss and cold face temperature, without exceeding the temperature limitation of the brick. This test method establishes placement of thermocouples and positioning of test specimens in the calorimeter.

¹ This test method is under the jurisdiction of ASTM Committee C08 on Refractories and is the direct responsibility of Subcommittee C08.02 on Thermal Stress Resistance.

Current edition approved Sept. 1, 2004. Published October 2004. Originally approved in 1945. Last previous edition approved in 1998 as C 202 – 93 (19938).

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.

3.2 This procedure must be used with Test Method C 201 and requires a large thermal gradient and steady state conditions. The results are based upon a mean temperature.

3.3 The data from this test method are suitable for specification acceptance, estimating heat loss and surface temperature, and design of multi-layer refractory construction.

3.4 The use of these data requires consideration of the actual application environment and conditions.

4. Apparatus

4.1 The apparatus shall consist of that described in Test Method C 201 with the addition of thermocouples, back-up insulation, and refractory fiber paper as described in Sections 6 and 7 of this test method.

5. Test Specimens

5.1 The test specimens shall be selected and prepared in accordance with Test Method C 201.

6. Installation of Thermocouples in Test Specimen

6.1 *Thermocouples*—Calibrated³ thermocouples shall be embedded in the test specimen at two points for measuring temperature. Platinum-10 % rhodium/platinum thermocouples shall be used. Wire of AWG Gage 28 (0.320 mm) shall be used in making the thermocouples.

6.2 *Installation of Thermocouples*—The hot junction of the thermocouples shall be placed in the center of each 9- by 4½-in. (228- by 114-mm) face and just below the surface of the test specimen. Grooves to receive the wire shall be cut in each 9- by 4½-in. face of the brick to a depth of 1/32 in. (0.8 mm) by means of an abrasive wheel 0.02 in. (0.5 mm) in thickness. The layout for the grooves allows all of the cold junction ends of the wires to extend from one end of the brick. A groove shall be cut in the center of each 9 by 4½-in. face along the 4½-in. dimension and ending 1 in. (25 mm) from each edge. The path of each groove is extended at an angle of 90° to one end of the brick by cutting grooves parallel to and 1.0 in. from the edge of the specimen. Before cementing⁴ the thermocouple wires in place, measurements shall be taken to obtain, within ±0.01 in. (0.3 mm), the eventual distance between the center lines of the

³ Method E 220 specifies calibration procedures for thermocouples.

⁴ Alundum Cement RA 562 supplied by the Norton Co., One New Bond St., Worcester, MA 01606, is satisfactory for this purpose.