



Standard Test Method for Bulk Density of Granular Refractory Materials¹

This standard is issued under the fixed designation C 357; 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 procedure for determining the bulk density of granular refractory materials, commercial products which usually have particles that are retained on a 0.265-in. (6.7-mm) or coarser sieve.

NOTE 1—This test method is not suitable for materials that hydrate in boiling water.

1.2 *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

E 11 Specification for Wire Cloth and Sieves for Testing Purposes

3. Significance and Use

3.1 Granular refractory materials may be either refractory grain raw materials that are used in the manufacture of finished refractory products, or bulk granular refractory materials that are sold, with or without some degree of processing, to refractory consumers for various uses. In either case, characterizing the properties of a granular refractory material is essential in evaluating its quality or consistency of quality and in determining suitability for end use. One of the important properties is bulk density because of its relationship to end product quality, usage, and performance.

3.2 The refractories producer can use this test method as one of the quality-control tests for his manufactured or mined refractory grain raw materials or for evaluating potential refractory grain raw materials.

3.3 For the refractories consumer, the principal use of this test method is in the evaluation of the quality or the consistency

of quality of the granular material in purchased refractory mixes or in bulk granular refractory materials used by the consumer.

3.4 This is a primary test method, and thus is suitable for use in specifications, quality control, and research and development. It can also serve as a referee test method in purchasing contracts or agreements and as a base for development of more rapid, secondary test methods for use in quality control on manufactured refractory raw materials.

3.5 Fundamental assumptions inherent in this test method are that the sample is representative of the material in general, the particle size of the sample is within the range specified by the test method, the material is not readily hydratable, and the size and quantity of pores in the material permits removal of surface water without drainage from the pores themselves. Deviation from any of these assumptions negates the usefulness of the test results.

3.6 In interpreting the results of this test method, it must be recognized that the specific gravity of the material as well as the porosity affects the value obtained for bulk density. Thus, comparisons of results should only be made between like materials or with full recognition of inherent differences between the materials being compared.

4. Apparatus

4.1 *Laboratory Jaw Crusher or Rolls*, for crushing samples to pass a 0.265-in. (6.7-mm) sieve.

4.2 *Standard Sieves, 0.265-in. and No. 8 (2.36-mm) with Pan and Cover (Note 2)*—The sieves shall conform to Specification **E 11**.

4.2.1 The coarser sieve may be the No. 4 (4.75 mm) and the finer sieve may be the No. 6 (3.35 mm) or No. 12 (1.70 mm), if tests indicate that the range in particle size is not critical.

NOTE 2—The 0.265-in., No. 4, No. 6, No. 8, and No. 12 ASTM sieves are equivalent to 3, 4, 6, 8, and 10-mesh, respectively, of the Tyler Standard Series.³

4.3 *Drying Oven*, adjustable to 220 to 230°F (105 to 110°C).

¹ This test method is under the jurisdiction of the ASTM Committee C08 on Refractories and is the direct responsibility of Subcommittee C08.03 on Physical Properties.

Current edition approved Oct. 1, 2007. Published November 2007. Originally approved in 1955. Last previous edition approved in 2002 as C 357–94 (2002)¹.

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 World Screening, Suite 30–148, Huntsville, AL 35802, Tel: 800-749-7999; Macon Wire, 2913 Joycliff Road, Macon, GA 31211, Tel: 800-768-9155; Gilson Company, P.O. Box 200, Lewis Center, OH 43035, Tel 800-444-1508, www.globalgilson.com; Fisher Scientific, 2000 Park Lane, Pittsburgh, PA 15275, Tel. 412-490-8300, www.fishersci.com.