



Designation: E1109 – 86 (Reapproved 2009)

Standard Test Method for Determining the Bulk Density of Solid Waste Fractions¹

This standard is issued under the fixed designation E1109; 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 determines the bulk density of various fractions from the resource recovery processing of municipal solid waste. It is intended as a means of characterizing such fractions and for providing data useful to designers of solid waste processing plants.

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.* Specific precautionary information is given in Section 7.

2. Referenced Documents

2.1 *ASTM Standards:*²

[C702 Practice for Reducing Samples of Aggregate to Testing Size](#)

[D75 Practice for Sampling Aggregates](#)

[E689 Reference Radiographs for Ductile Iron Castings](#)

[E1107 Test Method for Measuring the Throughput of Resource-Recovery Unit Operations](#)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *bulk density*—the mass per unit volume of particulate matter. Bulk density is not an absolute material property as is the density of individual particles of a material. The bulk density depends on the size of the container and how the material is loaded into the container. For example, the bulk density of material placed loosely in a container will be less than that of material tamped into a container. Also, some materials placed loosely in a container will settle with time due to its own weight; thus, its bulk density will increase.

¹ This test method is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.03 on Treatment, Recovery and Reuse.

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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.

4. Summary of Test Method

4.1 A sample of a solid waste stream is tamped in a cubical container of known volume and then weighed. Bulk density is calculated from the weight of the contents and volume of the container.

5. Significance and Use

5.1 This test method describes a physical property of solid waste in processing facilities; a property that characterizes the solid waste streams and hence the operation of resource recovery separators and processors.

5.2 The bulk density is an important property for the design of materials handling equipment, separators, and processors.

6. Apparatus

6.1 *Balance*—A balance or scale accurate within 0.1% of the test load at any point within the range of use. The range of use shall be considered to extend from the weight of the measure empty to the weight of the measure plus its contents.

6.2 *Cubical Measure*, with internal dimensions approximately 60 by 60 by 60 cm (24 by 24 by 24 in.) provided with handles. The interior surfaces of the measure shall be nonabsorbent to moisture.

NOTE 1—A satisfactory weigh box has been constructed of ¾ in. (1.9 cm) exterior grade plywood with the finished surface on the inside. Reinforcing strips, approximately 5 cm (2 in.) wide and 1.3 cm (½ in.) thick were fastened to the outside walls; two of them in a way to provide handles.

6.3 Larger cubical weigh boxes shall be used as necessary to accommodate large particles of material. No particle larger than two-thirds the length, height, or width of the weigh box shall be put into the weigh box in determining the bulk density.

7. Precautions

7.1 This procedure calls for the handling of solid waste and its processed fractions. Because the origin of all the materials is generally unknown, workers must use proper safety precautions when handling samples. Workers shall wear gloves and safety glasses. When appropriate, dust masks shall be worn. Workers must be cautioned to wash their hands thoroughly before eating or smoking.