



Designation: C520 – 04(Reapproved 2010)

Standard Test Methods for Density of Granular Loose Fill Insulations¹

This standard is issued under the fixed designation C520; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 These test methods are applicable to granular loose fill insulation materials such as vermiculite and perlite. They are used for other insulation materials with similar flow and settling properties.

1.2 *Method A* shall be used to determine bulk density.

1.3 *Method B* shall be used to determine design density and, with Method A, is used to calculate percent loss of volume due to settling.

1.4 *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

C168 Terminology Relating to Thermal Insulation

C390 Practice for Sampling and Acceptance of Thermal Insulation Lots

3. Terminology

3.1 The definitions of terms used in this method shall be in accordance with Terminology C168.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *bulk density*—the density of the granular material is determined in accordance with Method A. No conditioning is required unless specified. The density is determined for the material as received. The voids incorporated during the placement procedure are included.

3.2.2 *design density*—the density of the conditioned granular material, determined in accordance with Method B. The

normal voids incorporated during the placement and subsequent procedures are included.

3.2.3 *percent volume loss*—the loss in volume between the as received bulk density and the design density determined by induced settling procedures or specified conditioning, or both, expressed as a percent.

4. Significance and Use

4.1 *Method A* will be used primarily as a manufacturing quality control and field test method without the need for conditioning. For more accurate research purposes, conditioning shall be specified.

4.2 *Method B* will be used, when specified, to determine the density at which insulation properties such as thermal resistance and placement coverage are to be determined.

5. Apparatus

5.1 *Bulk Density Container*—A lightweight rigid box with interior length, width, and depth of 12.0 ± 0.1 in. (3.05 ± 3 mm). Scales or balances with an accuracy of at least 1 % of the specimen weight shall be used.

5.2 *Design Density Sample Container*—The specimen container shall be made of nominal $\frac{1}{2}$ in. thick construction grade plywood and two 48-in. (1220 mm) long sections of, nominal 2 by 8-in. lumber. The 2 by 8 sections of wood and plywood shall be used to provide inside container dimensions of 14.5 ± 0.1 in. (368 ± -3 mm) by 48 ± 0.1 in. ($1.22 \text{ m} \pm 0.003 \text{ m}$) by 7.5 ± 0.1 in. ($191 \text{ mm} \pm 3 \text{ mm}$). The inside dimensions of the specimen container shall be used to calculate the volume of the container.

5.3 *Screed*—A suitable piece of wood, metal, or plastic at least 20 in. (508 mm) long with a thin straight edge suitable for leveling the loose, granular material.

5.4 *Tapping Hammer and Frame*—This shall include a standard $7\frac{1}{2}$ -lb (3.4 kg) sledge hammer. The total length of the handle shall be approximately 34 in. (864 mm). A $\frac{1}{4}$ -in. (6-mm) hole is drilled through the handle to provide a pivot point $32\frac{1}{8} \pm \frac{1}{8}$ in. ($816 \text{ mm} \pm 3 \text{ mm}$) from the center line of the head of the hammer. The tapping hammer shall be mounted in a moveable frame as shown in Fig. 1.

¹ These test methods are under the jurisdiction of ASTM Committee C16 on Thermal Insulation and are the direct responsibility of Subcommittee C16.32 on Mechanical Properties.

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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.