



## Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation<sup>1</sup>

This standard is issued under the fixed designation C 1104/C 1104M; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

### 1. Scope

1.1 This test method covers the determination of the amount of water vapor sorbed by mineral fiber insulation exposed to a high-humidity atmosphere. This test method is applicable only to fibrous base material and binder. The results obtained by this test method cannot be used in describing faced products, since the facing is not tested by using this test method.

1.2 The water vapor sorption characteristics of materials may be affected by conditions such as elevated temperatures or chemical exposures. Values obtained as a result of this test method may not adequately describe the water vapor sorption characteristics of materials subjected to these conditions.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. Within the text, the inch-pound units are shown in parentheses. The values stated in each system are not exact equivalents, therefore, each system must be used independently of the other.

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:

- C 167 Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations<sup>2</sup>
- C 302 Test Method for Density of Preformed Pipe-Covering-Type Thermal Insulation<sup>2</sup>
- C 303 Test Method for Density of Preformed Block-Type Thermal Insulation<sup>2</sup>
- C 390 Criteria for Sampling and Acceptance of Preformed Thermal Insulation Lots<sup>2</sup>

### 3. Terminology

#### 3.1 Definitions of Terms Specific to This Standard:

- 3.1.1 The term sorption has been adopted for this test

method, since mineral fiber insulation may *absorb* water within its bulk when viewed macroscopically, while it *adsorbs* water onto individual fibers on a microscopic scale.

(1) *sorption*—refers to the taking up and holding of matter by other matter by various processes such as absorption and adsorption.

(2) *absorption*—refers to the taking up of matter in-bulk by other matter; for example, the penetration of substances into the bulk of another solid or liquid.

(3) *adsorption*—refers to surface retention or adhesion of an extremely thin layer of molecules to the surfaces of solids or liquids with which they are in contact.

### 4. Summary of Test Method

4.1 The insulation is dried to a constant weight and exposed to a high-humidity atmosphere for 96 h. The amount of water sorbed from the vapor phase is the difference in specimen weights, and is expressed in either weight or volume percent.

### 5. Significance and Use

5.1 The sorption of water can result in an increase in weight and a resultant potential degradation of the properties of the insulation.

### 6. Apparatus

6.1 *Air-circulating oven*, capable of maintaining a temperature between 102° and 121°C (215° and 250°F).

6.2 *Desiccator*, with calcium chloride as a desiccant.

6.3 *Scale*, accurate to  $\pm 0.1$  % of specimen weight.

6.4 *Environmental test chamber*, capable of maintaining a temperature of  $49 \pm 2^\circ\text{C}$  ( $120 \pm 3^\circ\text{F}$ ) and a relative humidity of  $95 \pm 3$  %.

6.5 *Steel rule*, graduated in 1 mm or 0.05 in. intervals with depth gauge as described in Test Methods C 167.

6.6 *Sealable polyethylene sample bags* of a size large enough to accommodate the test specimens (for blanket, board, or pipe thermal insulations).

6.7 *Non-water-sorbing, non-corrosive tray* with tight-fitting lid measuring at least 15 by 15 cm (6 by 6 in.) (for loose-fill insulations).

### 7. Sampling and Test Specimens

7.1 Three specimens shall be tested, unless otherwise stated in the appropriate material specification. These are to be

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.06.