



Standard Test Method for Moisture Retention Curves of Porous Building Materials Using Pressure Plates¹

This standard is issued under the fixed designation C1699; 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 specifies a laboratory procedure for the determination of the water retention curve (or moisture storage capacity) of porous building materials at very high relative humidity (RH) levels (≈ 95 to 100% RH) corresponding to the capillary moisture region of the sorption isotherm. This is achieved by using the pressure plate test apparatus. This technique was originally developed to study soil moisture content and eventually had been adapted to building construction materials.

1.2 At higher RH levels (≈ 95 to 100% RH) of the sorption isotherm (see Test Method C1498), use of climatic chamber is not an option. This technique uses overpressure to extract water out of the pore structure of porous materials until equilibrium between the moisture content in the specimens and the corresponding overpressure is achieved. Using the pressure plate extractors, equilibrium can only be reached by desorption.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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

C1498 Test Method for Hygroscopic Sorption Isotherms of Building Materials

D2325 Test Method for Capillary-Moisture Relationships for Coarse- and Medium-Textured Soils by Porous-Plate Apparatus (Withdrawn 2007)³

D3152 Test Method for Capillary-Moisture Relationships for Fine-Textured Soils by Pressure-Membrane Apparatus (Withdrawn 2007)³

E337 Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures)

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *desorption isotherm*—the sorption isotherm measured exclusively during the hygroscopic desorption process started from the condition of full water saturation of the material.

3.1.2 *sorption isotherm*—relationship between the relative humidity (see Test Method E337) and the equilibrium moisture content of the material, at a specified temperature.

3.1.3 *pressure-plate facility*—Heavy steel vessel capable of holding different pressure levels.

3.1.4 *moisture content, by mass*—mass of water retained in the specimen divided by the dry mass of the specimen.

4. Significance and Use

4.1 The purpose of this test is to obtain, by means of a specified laboratory procedure, the values of the equilibrium moisture content at higher RH levels (≈ 95 to 100%). These values are used either as means to characterize the material or as material characteristics needed as input to appropriate computer models that can simulate wetting or drying potential of individual building materials or material assemblies under specified environmental conditions.

5. Apparatus

5.1 *Pressure vessel*—Heavy-duty steel vessels of approximately 305 mm in diameter and about 75 mm or 250 mm high with heavy top lid tightly-held against O-ring gasket by clamping bolts (see Fig. 1).

¹ This test method is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.33 on Insulation Finishes and Moisture.

Current edition approved May 1, 2015. Published August 2015. Originally approved in 2008. Last previous edition approved in 2009 as C1699–09. DOI: 10.1520/C1699-09R15.

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 The last approved version of this historical standard is referenced on www.astm.org.