



Designation: C 272 – 91 (Reapproved 1996)

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions¹

This standard is issued under the fixed designation C 272; 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 the determination of the relative rate of water absorption by various types of structural core materials when immersed or in a high relative humidity environment. This test method is intended to apply to only structural core materials; honeycomb, foam, and balsa wood.

1.2 The values stated in inch-pound units are to be regarded as the standard. The SI units given may be approximate.

1.3 *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 271 Test Method for Density of Sandwich Core Materials²

D 1193 Specification for Reagent Water³

3. Significance and Use

3.1 The moisture content of most core materials is related to such properties as electrical properties (such as dielectric, loss tangent, electrical resistance) and mechanical properties (such as strength and modulus). Also important is the amount of weight the structure may gain by the core absorbing water. It should be noted that in a sandwich panel there are facings bonded on two sides of the core that effect the amount of water absorbed by the core.

4. Apparatus

4.1 *Analytical Balance*, capable of measurement to 0.001 g.

4.2 *Circulating Air Oven*, capable of maintaining uniform temperatures with an accuracy of $\pm 5^\circ\text{F}$ ($\pm 3^\circ\text{C}$).

4.3 *Humidity Chamber*, capable of maintaining uniform relative humidity with an accuracy of $\pm 5\%$ and a uniform

temperature with an accuracy of $\pm 5^\circ\text{F}$ ($\pm 3^\circ\text{C}$).

4.4 The water used in this test method should be distilled water (Specification D 1193, Type IV reagent water) or deionized water.

5. Test Specimens

5.1 The test specimen shall be 3 by 3 by 0.5 in. thick (76.2 by 76.2 by 12.7 mm thick). The thickness of the specimen shall be in the same direction as the core thickness when used in a sandwich panel.

5.2 Machine, saw, or shear the test specimens from the core sample so as to have smooth surfaces that are free from cracks.

5.3 Measure the length and width dimensions to the nearest 0.01 in. (0.254 mm) and the thickness to the nearest 0.001 in. (0.0254 mm).

6. Conditioning

6.1 Weigh five specimens individually and then oven dry as follows:

6.1.1 For materials whose water absorption value would be affected by temperatures approximately 230°F (110°C), dry the specimens in an oven for 24 h at $120 \pm 5^\circ\text{F}$ ($49 \pm 3^\circ\text{C}$), cool in a desiccator to room temperature, remove, immediately weigh and record the weight.

6.1.2 For materials whose water absorption value has been shown not to be affected by temperatures up to 230°F (110°C), dry the specimens in an oven for 2 h at $225 \pm 5^\circ\text{F}$ ($107 \pm 3^\circ\text{C}$), cool in a desiccator to room temperature, remove, and immediately weigh and record the weight.

6.1.3 In the case of a new material the water absorption properties of which are not known, condition the specimens in accordance with 6.1.1 and 6.1.2 until sufficient experience on the effect of temperature is achieved to indicate the selection of the most satisfactory method.

7. Procedure

7.1 *Test Method A—Twenty-Four-Hour Immersion*—Completely immerse the specimens in a container of $73 \pm 5^\circ\text{F}$ ($23 \pm 3^\circ\text{C}$) water. Materials that float should be held under water by a loose net. At the end of 24 h, remove the specimens, shake vigorously, wipe off all surface water with a dry cloth, immediately weigh and record the weight. For materials that tend to collect water on the surfaces or trap water in corners,

¹ This test method is under the jurisdiction of ASTM Committee D-30 on Composite Materials and is the direct responsibility of Subcommittee D30.09 on Sandwich Construction.

Current edition approved Dec. 15, 1991. Published May 1992. Originally published as C 272 – 51 T. Last previous edition C 272 – 53 (1980). ^{ϵ 1}

² *Annual Book of ASTM Standards*, Vol 15.03.

³ *Annual Book of ASTM Standards*, Vol 11.01.