



Designation: C 272 – 01

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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

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

1. Scope

1.1 This test method covers the determination of the relative amount 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 SI units are to be regarded as the standard. The inch-pound 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

C 274 Terminology of Structural Sandwich Constructions²

D 1193 Specification for Reagent Water³

3. Terminology

3.1 *Definitions*—Terminology C 274 defines terms relating to sandwich constructions.

4. Summary of Test Method

4.1 A small piece of the core material is conditioned in various moisture conditions, and the amount of moisture absorbed is measured by the weight increase in the specimen.

5. Significance and Use

5.1 The moisture content of most core materials is related to such properties as electrical properties (such as dielectric

constant, loss tangent, and electrical resistance) and mechanical properties (such as strength and modulus). The amount of weight the structure may gain by the core absorbing water is also important. It should be noted that in a sandwich panel there are facings bonded on two sides of the core that affect the amount of water absorbed by the core.

6. Interferences

6.1 *Material and Specimen Preparation*—Cracks in the specimen and rough surfaces can increase the apparent water absorption.

6.2 *Surface Water*—Some core materials tend to collect water on the surfaces or trap water in corners, and, if not removed will give incorrect results.

7. Apparatus

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

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

7.3 *Humidity Chamber*, capable of maintaining uniform relative humidity with an accuracy of $\pm 5\%$ and a uniform temperature with an accuracy of $\pm 3^{\circ}\text{C}$ ($\pm 5^{\circ}\text{F}$).

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

8. Sampling and Test Specimens

8.1 Test at least five specimens per test condition unless valid results can be gained through the use of fewer specimens, such as in the case of a designed experiment.

8.2 The test specimen shall be 75 by 75 by 12.7 mm (3 by 3 by 0.5 in.) thick. The thickness of the specimen shall be in the same direction as the core thickness when used in a sandwich panel.

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

8.4 Measure the length and width dimensions to the nearest 0.25 mm (0.01 in.) and the thickness to the nearest 0.025 mm (0.001 in.).

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

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

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