



Designation: **F 1645 – 9500**

Standard Test Method for Water Migration in Honeycomb Core Materials¹

This standard is issued under the fixed designation F 1645; 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 water migration in honeycomb core materials.
- 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:*

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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C 271 Test Method for Density of Sandwich Core Materials for ~~Sandwich~~ ~~Constructions~~²

3. Significance and Use

3.1 This test method determines the rate of water migration between honeycomb core cells.

4. Apparatus

4.1 *Micrometer, Gage, or Caliper*, capable of measuring accurately to 0.025 mm (0.001 in.).

4.2 *Weighing Scale*, capable of measuring accurately to $\pm 0.5\%$.

4.3 *Water Migration Setup*, burret, rubber hose, clamps, stand.

5. Test Specimens

5.1 The test specimens may be any convenient size of core material as agreed upon by the purchaser and the seller. The minimum specimen size recommended is 76- by 76-mm (3- by 3-in.) cross section and 12.7 mm (0.5 in.) thick. The facings shall be of impervious, transparent material to permit visual observation into the core cells by illumination, and they shall be bonded to the core with a water-resistant adhesive.

6. Conditioning

6.1 It is recommended that the tests be conducted at $23 \pm 3^\circ\text{C}$ ($73 \pm 5^\circ\text{F}$), $50 \pm 5\%$ relative humidity, and the specimens be conditioned to constant weight ($\pm 1\%$) under those conditions before testing.

7. Procedure

7.1 Determine the density of each specimen per Test Method C 271, if required.

7.2 Bond the facings to the core. Clear plastic facings are recommended as this will make it possible to drill a hole in the upper facing over a single cell and observe where the water migrated. The adhesive shall be applied so that fairly heavy fillets form between the core cell walls and the facings, thus assuring a watertight joint between the facings and core. A clear adhesive is recommended.

7.3 A hole shall be drilled through the upper facing over one centrally located core cell. The hole must lead into only one cell.

7.4 A suitable connection shall be provided, such as a tube bonded over the hole, for the application of hydrostatic pressure (see Fig. 1).

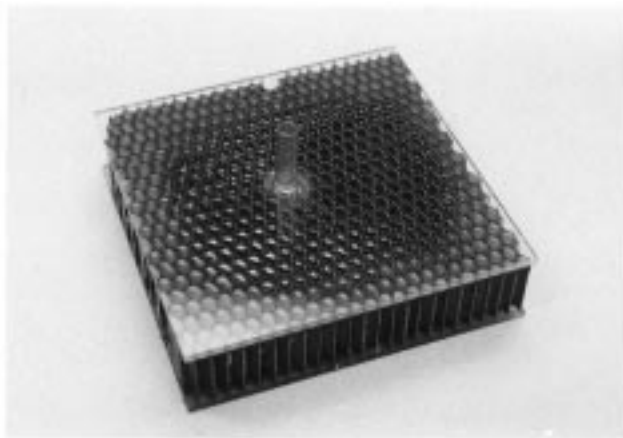


FIG. 1 Water Migration Specimen

7.5 The primary cell shall be filled with distilled or deionized water, measuring the volume of water required (a graduated syringe works well) or the increase in weight of the sandwich specimen. It is recommended that a colored dye be added to the water to make it easier to see where the water has migrated.

7.6 The primary cell shall then be connected to a room temperature distilled or deionized water source under a constant head of 914 mm (3 ft) (see Fig.-2)- 2).

7.7 The amount of water, transfused during a 24-h period, shall be determined by weighting the specimen or by measuring the volume transfused, if required. Some specifications state that the water cannot migrate further than the six contiguous cells. Other specifications limit the equivalent number of cells the water migrated into.

7.8 On a honeycomb diagram (see Fig. 3), mark the cells into which water has migrated.

² Annual Book of ASTM Standards, Vol 15.03.

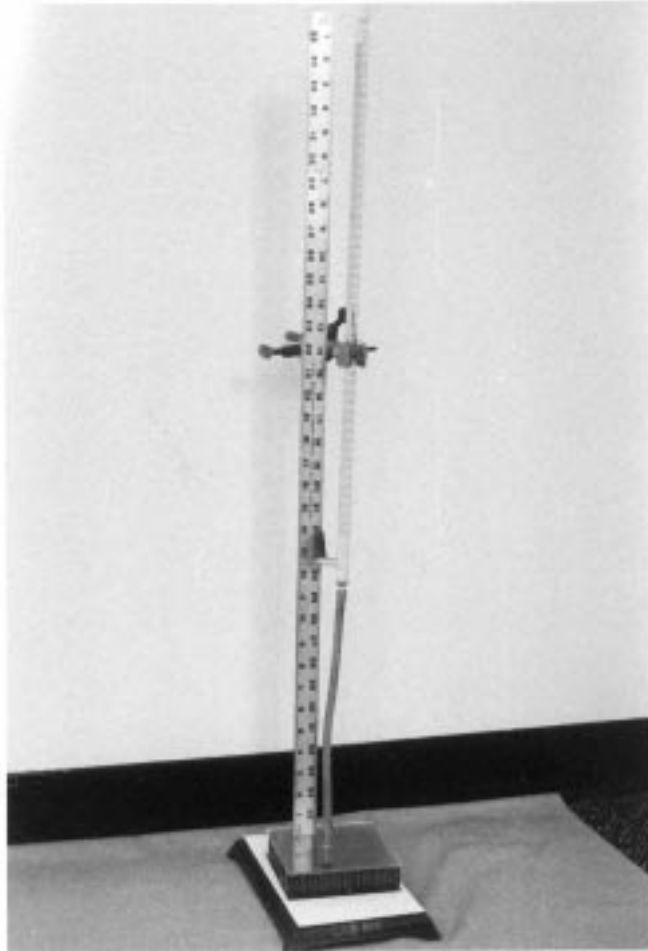


FIG. 2 Test Setup

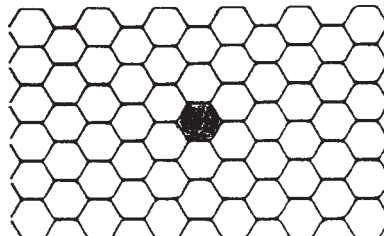


FIG. 3 Honeycomb Cell Diagram

8. Calculations

8.1 The water migration shall be computed as being the cells filled in the 24-h period. This can be obtained by dividing the amount of transfused water by the amount necessary to fill one cell.

$$\text{cells water migrated} = \frac{\text{transfused water}}{\text{amount to fill one cell}}$$

$$\left[\frac{\text{mg (lbs)}}{\text{mg (lbs)}} \text{ or } \frac{\text{mm}^3 (\text{in.})^3}{\text{mm}^3 (\text{in.})^3} \right] \quad (1)$$

9. Report

9.1 The report shall include the following:

- 9.1.1 Complete description of core material,
- 9.1.2 Size of test specimens and core thickness,
- 9.1.3 Conditioning procedures,
- 9.1.4 Core density, cells water migrated, individual values, average, if required,

9.1.5 Diagrams showing the cells the water has migrated into, if required.

10. Precision and Bias

~~10.1 Precision—The precision of the procedure in Test Method F 1645 data required for measuring core material water migration will be determined in the future. development of a precision statement are not available for this test method.~~

~~10.2 Bias—Since there is no accepted reference material suitable—Bias cannot be determined for determining the bias for the procedure in this test method, bias has not been determined. method as no acceptable reference material exists.~~

11. Keywords

11.1 core; honeycomb; water migration

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