



Designation: D 6772 – 02

Standard Test Method for Dimensional Stability of Sandwich Core Materials¹

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1. Scope

1.1 This test method covers the determination of the sandwich core dimensional stability in the two plan dimensions.

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

3. Terminology

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

3.2 *Symbols:*

L_i = initial measured dimension

L_f = final measured dimension

4. Summary of Test Method

4.1 A small piece of honeycomb is placed in an elevated temperature environment and after cooling, the dimensional changes in the plan dimensions are measured and compared to the initial measurements. A typical honeycomb specimen is shown in Fig. 1.

5. Significance and Use

5.1 Sandwich panel cores may change plan dimensions when heated. It is prudent to know if this may be a problem with the final part dimensions.

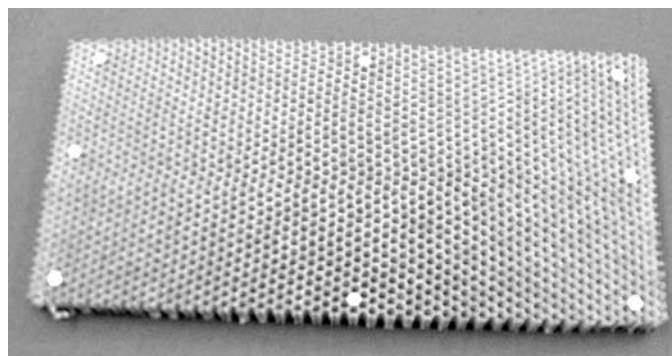


FIG. 1 Dimensional Stability Specimen

6. Interferences

6.1 If oven size is limited, smaller specimens may be used.

6.2 If the specimen warps, flatten it out while making the measurements.

7. Apparatus

7.1 *Oven*, capable of maintaining a controlled temperature $\pm 3^\circ\text{C}$ ($\pm 5^\circ\text{F}$).

7.2 *Scale*, capable of measuring accurately to 0.25 mm (0.01 in.).

7.3 *Micrometer*, capable of measuring accurately to 0.025 mm (0.001 in.).

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 specimens, if possible, should be approximately 460 by 915 mm (18 by 36 in.) in plan dimension, and the thickness shall be approximately 12.7 mm (0.50 in.). For honeycomb cores, the 460-mm (18-in.) dimension is the core's ribbon or L direction. Other dimensions can be used, but must be reported.

9. Calibration

9.1 The accuracy of all measuring equipment shall have certified calibrations that are current at the time of use of the equipment.

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.

10. Conditioning

10.1 When the physical properties of the material are affected by moisture, bring the test specimens to constant weight ($\pm 1\%$) before testing. A temperature of $23 \pm 3^\circ\text{C}$ ($73 \pm 5^\circ\text{F}$) and a relative humidity of $50 \pm 5\%$ are recommended.

11. Procedure

11.1 Weigh the specimens in grams (pounds) to a precision of $\pm 0.5\%$.

11.2 Determine the plan dimensions of the specimens in millimetres (inches) to a precision of $\pm 0.5\%$.

11.3 Measure the thickness of the specimens in millimetres (inches) to the nearest 0.025 mm (0.001 in.).

11.4 Mark the specimen in eight locations as shown in Fig. 1. For honeycomb core, it is recommended that the cells be potted with a resin at the eight locations and then marked (see Fig. 2).

11.5 Make three measurements in one direction and three measurements in the other direction, as shown in Fig. 3.

11.6 Preheat the oven to $175 \pm 3^\circ\text{C}$ ($350 \pm 5^\circ\text{F}$) and place the specimen flat on a wire-mesh-type shelf. Other temperatures can be used but must be reported.

11.7 After 90 min, remove the specimen from the oven and allow to cool.

11.8 When the specimen is at room temperature, remeasure the six dimensions.

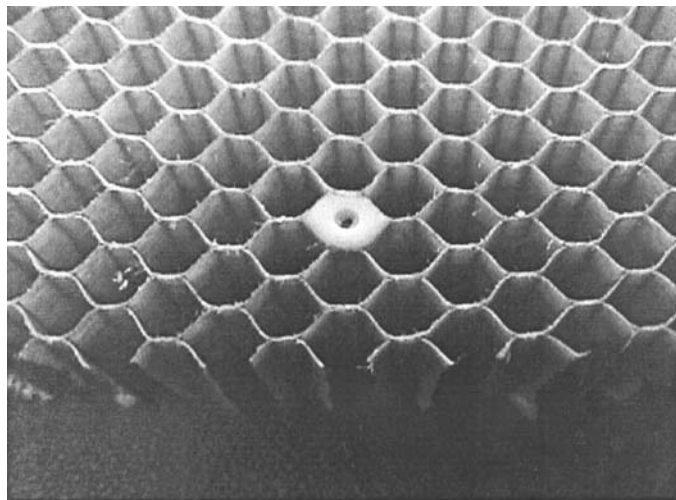


FIG. 2 Potted Honeycomb Cell

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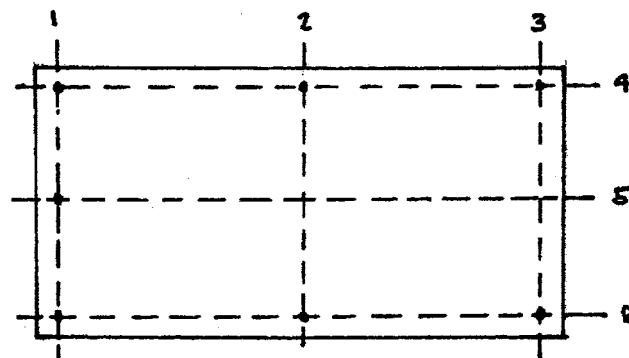


FIG. 3 Measurement Locations

12. Calculations

12.1 Calculate the densities of the specimens using Test Method C 271.

12.2 Calculate the dimensional changes as follows:

$$\text{percent change} = \frac{(L_f - L_i)}{L_i} \times 100 (\%) \quad (1)$$

where:

L_i = initial measured dimension, and

L_f = final measured dimension.

13. Report

13.1 The report shall include the following:

13.1.1 Description of the test specimens,

13.1.2 Dimensions of the test specimens and densities,

13.1.3 Oven temperature and length of time specimens are in oven, and

13.1.4 Individual dimensional changes, average dimensional changes, and maximum dimensional changes in percent for the two directions.

14. Precision and Bias

14.1 *Precision*—The data required for the development of a precision statement are not available for this test method.

14.2 *Bias*—Bias cannot be determined for this test method as no acceptable reference material exists.

15. Keywords

15.1 core; dimensional stability; honeycomb