



Designation: ~~D3769~~—~~10~~ D3769 – 15

## Standard Test Method for Microcellular Urethanes—High-Temperature Sag<sup>1</sup>

This standard is issued under the fixed designation D3769; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

### 1. ~~Scope~~ Scope\*

1.1 This test method covers the procedure and apparatus for measuring high-temperature sag of microcellular urethane materials.

1.2 The values stated in SI units are to be regarded as standard.

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.*

NOTE 1—There is no ~~similar or equivalent ISO standard~~ known ISO equivalent to this test method standard.

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

[D3040 Practice for Preparing Precision Statements for Standards Related to Rubber and Rubber Testing](#) (Withdrawn 1987)<sup>3</sup>

[E145 Specification for Gravity-Convection and Forced-Ventilation Ovens](#)

[E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)

### 3. Significance and Use

3.1 This test method is used to indicate the deformation tendency of microcellular materials that may occur during paint application in an assembly plant operation. Since a standard specimen is used, do not assume heat sag measurements ~~cannot be assumed~~ to be exactly those which will occur on a part during or after the paint application and baking operation of an assembly process.

3.2 Before proceeding with this test method, reference ~~should~~ shall be made to the specification of the material being tested. Any test specimen preparation, conditioning, or dimensions, or combination thereof, and testing parameters covered in the materials specification shall take precedence over those mentioned in these test methods. If there are no material specifications, then the default conditions apply.

NOTE 2—This test method is applicable to solid urethanes.

### 4. Apparatus

4.1 *Test Fixture*, capable of holding the specimens in a fixed cantilever position for the duration of the entire test procedure. The test fixture shall be constructed from a material such as aluminum or steel that exhibits a low coefficient of linear thermal expansion and therefore allows the test fixture's height to be considered constant through the test. See [Fig. 1](#).

4.2 *Oven*, conforming to the specifications for a Type IA laboratory oven in accordance with Specification [E145](#).

4.3 *Scaled Rule*, accurate to 1 mm.

4.4 *Thickness Indicator*, accurate to 0.03 mm.

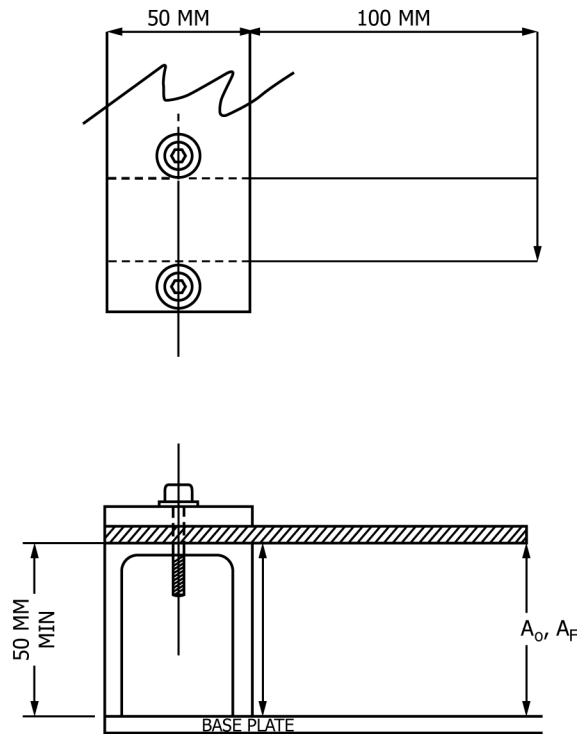
<sup>1</sup> This test method is under the jurisdiction of ASTM Committee [D20](#) on Plastics and is the direct responsibility of Subcommittee [D20.22](#) on Cellular Materials - Plastics and Elastomers.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

\*A Summary of Changes section appears at the end of this standard



NOTE 1—Not to scale.

FIG. 1 Fixture for High-Temperature Sag

4.5 *Base*, a flat, smooth surface free of any surface irregularities that would affect the height measurements. The base must be heat-resistant to the maximum temperature that the test fixtures will be exposed.

## 5. Test Specimens

5.1 The test specimen shall have a minimum length of 125 mm, and be  $25 \pm 1$  mm in width by the nominal thickness of the plaque or part. The recommended standard test specimen is 4 mm in thickness. The minimum specimen thickness shall be 3 mm.

5.2 Three specimens to each material shall be tested.

NOTE 3—If test specimens are cut from parts, the specimens must be cut from areas that are of constant thickness; that is, no ribs, bosses, holes, or other section changes are allowed.

## 6. Conditioning

6.1 Unless otherwise specified, condition the specimens and fixture a minimum of 1 h at  $23 \pm 2^\circ\text{C}$  and  $50 \pm 10\%$  relative humidity before testing.

## 7. Procedure

7.1 Measure the thickness in the clamping area of the test specimen to the nearest 0.03 mm.

7.2 Clamp the specimen in the fixture with a  $100 \pm 1$  mm unsupported overhang. Primed or painted surfaces are to be mounted facing up.

7.3 After 5 min, measure the distance between the base and the unsupported end of the specimen as shown in Fig. 1 and call this  $A_o$ .

7.4 Place the clamped specimen in an air-circulating oven at the test temperature of  $120 \pm 1^\circ\text{C}$  for  $60 \pm 1$  min.

7.5 After oven aging, remove the fixture with the specimen from the oven.

7.6 After 5 min, repeat the measurement as in 7.3 for  $A_o$  and call this distance  $A_f$ .

NOTE 4—Other combinations of test temperatures, test times, and overhang lengths are permitted subject to prior agreement between the test requestor and the testing facility. These conditions are to be included in the test report.

## 8. Calculation

8.1  $\text{Sag} = A_o - A_f$