



Dimensional Stability

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This test procedure is used to determine the dimensional stability of textile materials after exposure to moisture and moderately high heat.

1.2 Applicability. This procedure applies to automotive textiles.

1.3 Remarks. This test procedure determines the dimensional change of material after immersion in water, drying for a prescribed period of time and then exposure to a moderately high temperature.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3221

3 Resources

3.1 Facilities.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Apparatus for conditioning to the appropriate requirements as described in GMW3221 Code A, unless otherwise specified in the relevant test procedure.

3.2.2 Steel scale graduated in millimeters.

3.2.3 Pans at least 300 mm × 300 mm to allow wetting of material test specimens. Only one (1) material test specimen shall be placed in each pan.

3.2.4 Wire mesh with internal openings of 3 mm to 6 mm.

3.2.5 Oven to permit sample aging at $+90\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$.

3.2.6 Cutting dies or shears for preparation of test specimens.

3.2.7 Calipers or depth gauge.

3.3 Test Vehicle/Test Piece. Textiles.

3.4 Test Time.

Calendar time: 2 days
Test hours: 2 hours
Coordination hours: Not applicable

3.5 Test Required Information.

 Not applicable.

3.6 Personnel/Skills.

 Personnel trained in accordance with the laboratory accreditation and Standard Operating Procedure requirements.

4 Procedure

4.1 Preparation.

 Use ink, staples, thread or other waterproof marking materials for test specimen preparation.

4.1.1 Unless otherwise specified in the relevant test procedure, conditioning shall be performed to GMW3221 Code A.

4.1.2 Prepare at least two (2) test specimens: 250 mm $\pm$ 5 $\times$ 250 mm $\pm$ 5 mm.

4.1.3 Draw a box 200 mm $\pm$ 2 mm $\times$ 200 mm $\pm$ 2 mm in the middle of each test specimen. Place marks, staples, or thread at each end and in the middle of each side of the box.

4.1.4 Measure and record the perpendicular distance (L_0) between both sets of parallel lines at the three (3) marked points.

Note: All measurements shall be made on a flat horizontal surface.

4.2 Conditions.

 Not applicable

4.2.1 Environmental Conditions. Oven at +90 °C $\pm$ 3 °C.

4.3 Instructions.

4.3.1 Place the test specimens onto wire mesh in a pan of clean tap water at standard conditions for 1.5 h $\pm$ 0.5 h ensuring all surfaces are wetted by submerging the test specimens.

4.3.2 Remove the test specimens and mesh, keeping the samples on the mesh, and allow to drip dry in a horizontal plane for 30 minutes $\pm$ 10 minutes at standard conditions.

4.3.3 Measure and record the distance (L_1 wet) between both sets of parallel lines as done during test specimens' preparation (4.1.4).

4.3.4 Using the mesh to transport the specimens, place them in a horizontal position in an oven at +90 °C $\pm$ 3 °C for 24 h $\pm$ 1 h.

4.3.5 Remove the test specimens, while still on the mesh, from the oven. Take the test specimens off of the mesh and cool them in standard conditions for 30 minutes $\pm$ 10 minutes.

4.3.6 Measure and record the distance (L_1 dry) between both sets of parallel lines as done during test specimen preparation (4.1.4).

4.3.7 Laminated Fabrics Only. Lay test specimen on a flat surface concave side up. From the end of the test specimen, measure and record the maximum amount of curl using a depth gauge or calipers. The measurement shall be taken from the top of the flat surface to the bottom side of the test specimen.

5 Data

5.1 Calculations. Calculate the dimensional stability for each condition and in each direction using the following formula:

$$\text{Dimensional Stability} = \frac{(L_1 - L_0)}{L_0} \times 100$$

Where:

L_0 is the original measurement and L_1 is the measurement after each condition.

5.1.1 Calculate the average dimensional stability for each condition and direction using the relevant values generated in 5.1.