



Material Settling/Deformation of Vehicle Floor Insulation

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. Determination or definition of the indentation (deflection/deformation) and settling characteristics of flexible floor carpet assemblies (carpet, mass back and insulation), especially in the foot well, foot rest and rocker-surrounding areas, caused by the application of a static force.

1.2 Applicability. This standard applies to all floor carpet assemblies with flexible/yielding acoustic insulation materials. The carpet insulator materials include, but are not limited to, foam, fiber (dissipative carpet constructions) and cotton shoddy. In addition, this specification applies to floor carpet assemblies with both the insulation layer as Part of the Assembly (POA) and as a separate component (non-POA).

1.3 Remarks. Floor carpet insulators are acoustically absorbent substances that possess a certain yield under load. An incorrect specification of the floor carpet insulator deflection characteristics may translate into extremely soft or hard floor surfaces, which can be felt to be unpleasant on a subjective basis. On the other hand, an increased insulator deflection along the rocker-surrounding area may increase the risk for the overlapped carpet to be pulled out of the garnish sill plates, when the customer steps in the area during an egress/ingress operation. Therefore, it is extremely important to examine these floor insulation materials and determine their flexibility, compression and indentation characteristics.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

2.3 Additional References.

- Component drawing.
- Specification of the floor carpet insulator deflection characteristics.
- Test report.

3 Resources

3.1 Facilities. The test shall be performed on a flat, solid surface (preferably on a stable measuring plate).

A specific force shall be maintained constantly on a defined area for a fixed period of time during the test. In addition, the test equipment shall be in a position that allows the measurement of the settling characteristics of the test piece under load.

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 Adjustable measuring linkage.

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3.2.2 Base plate/load-bearing surface with a diameter of 80 mm (rigid material, e.g., 20 mm thick wood; Polyvinyl chloride (PVC)).

3.2.3 Caliper gauge, measuring tape or dial gauge.

3.2.4 Test load: 49 N for Condition A (see 3.3a) and 200 N for Condition B (see 3.3b).

3.2.5 The date of measurement and equipment information should be recorded in Data Sheet B1: Measuring Device List (see Appendix B).

3.3 Test Vehicle/Test Piece. The test specimen should consist of a 300 mm x 300 mm with the following two different conditions:

- a. **Condition A.** A test sample of a molded floor carpet section (with all pertaining construction layers, e.g., carpet pile, mass back, latex, polyethylene (PE), insulator, etc.) The insulation layer thickness section shall be cut from the floor pan traffic area and in a way that comprehends the maximum insulator thickness allocated in that area of the floor carpet assembly design for a particular vehicle program. For carpet systems with the insulation layer as Part of the Assembly (POA), the entire system is tested (carpet + insulation); for carpet systems in which the insulation layer is non-POA, only the insulation layer is tested.
- b. **Condition B.** A test sample of molded floor carpet section (with all pertaining construction layers, e.g., carpet pile, mass back, latex, polyethylene (PE), insulator, etc.) The insulation layer thickness shall be of 25 mm.

Three (3) test pieces are measured (see 3.3).

3.4 Test Time.

Calendar time: 1 day

Test hours: 8 h

Coordination hours: 1 h

3.5 Test Required Information. Material characteristics of the test piece.

3.6 Personnel/Skills. Technical personnel.

4 Procedure

4.1 Preparation. Test pieces (Including Expanded polypropylene (EPP) foam fillers) and load-bearing surface are placed on the measuring plate (see Figure 1). Then, the initial measurement shall be performed which corresponds to the distance that exists between the adjustable measuring linkage and the top face of the load-bearing surface, without a test load. This data point should be referred to as "Initial position of the load bearing surface", and should be recorded in Data Sheet A1 (see Appendix A).

4.2 Conditions.

4.2.1 Environmental Conditions. The test shall be performed at $(+23 \pm 5) ^\circ\text{C}$.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions. Condition A (See 3.3a).

Note: Deviations from the requirements listed in the following paragraphs shall have been agreed with the Floor Trim Bill of Material (BOM) Family Owner (BFO) and Interior Validation Total Integration Engineer (TIE).

4.3.1 After the initial measurement from 4.1, the test load of 49 N is applied to the geometric center of the load-bearing element, which has been previously placed on top of the test piece (see Figure 1).

4.3.2 Immediately after this, the deformation is measured using the gauge, and recorded as "Immediate Deformation in mm" in Data Sheet A1 (see Appendix A). The deformation in mm is related to the indentation characteristics of the test sample, when the load is applied. The maximum immediate deformation allowed is 9 mm.

4.3.3 Without removing the test load, and after 60 minutes, a further deformation measurement is taken and recorded as "Deformation after 60 minutes in mm" in Data Sheet A1 (see Appendix A). The maximum deformation allowed after 60 minutes is 9 mm.

4.3.4 The permanent settling is the deformation seen by the test specimen after a stress-relief period of 60 minutes. The permanent settling characteristic of the test specimen is measured after removing the test load and providing a stress-relief period of 60 minutes, and should be recorded as "Permanent settlement after 60 minutes stress-relief" in Data Sheet A1 (see Appendix A). The maximum permanent settling allowed is 3 mm.

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