



Floor Mat Retention Tests

1 Scope

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. To evaluate and quantify floor mat retention forces in passenger cars and light duty trucks.

1.2 Foreword. Floor mats are an integral part of the vehicle flooring system. Several factors may influence the retention properties of a floor mat in a vehicle. The size, shape, conformance with the floor contour, flooring and floor mat materials, and the characteristics of the flooring and floor mat interface are some of the design-related variables affecting retention. Higher frictional force at the floor mat and carpet interface improves the floor mat retention. This procedure provides standardized methods to measure these frictional forces and thereby a basis for design optimization.

1.3 Applicability. This procedure applies to passenger cars and light duty trucks.

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.

None

3 Resources

3.1 Facilities. Test may be performed anywhere.

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 Vacuum cleaner.

3.2.2 Calibrated force ring and bridge amplifier with calibrated output (0 to 2224 N (0 to 500 lb)).

3.2.3 Digital Multimeter (DMM) with peak and hold function. Fluke 8024B or equivalent.

3.2.4 Torque wrench with follow-up pointer (0 to 125 N·m) 19 mm ($\frac{3}{4}$ in) socket attached. Snap-on model TESLI25FU or equivalent.

3.2.5 Test fixture shown in Figure 1 and Figure 2.

3.2.6 Roll of adhesive-backed hook and loop tape (e.g., Velcro 10.1 cm (4 in) wide).

3.2.7 Standard barbell-type weights: 4.5 kg (10 lb) and 9.07 kg (20 lb).

3.2.8 Weigh scale capable of 1 g accuracy.

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Page 1 of 10

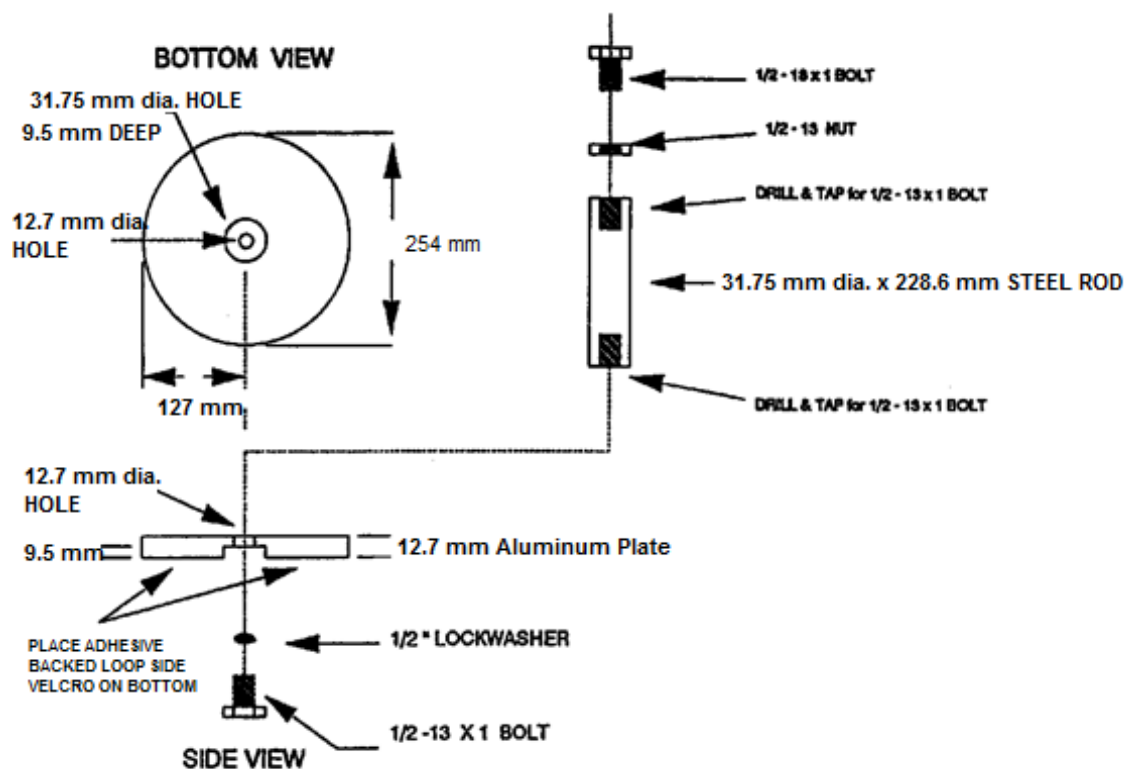


Figure 1: Floor Mat Test Fixture (not to scale)

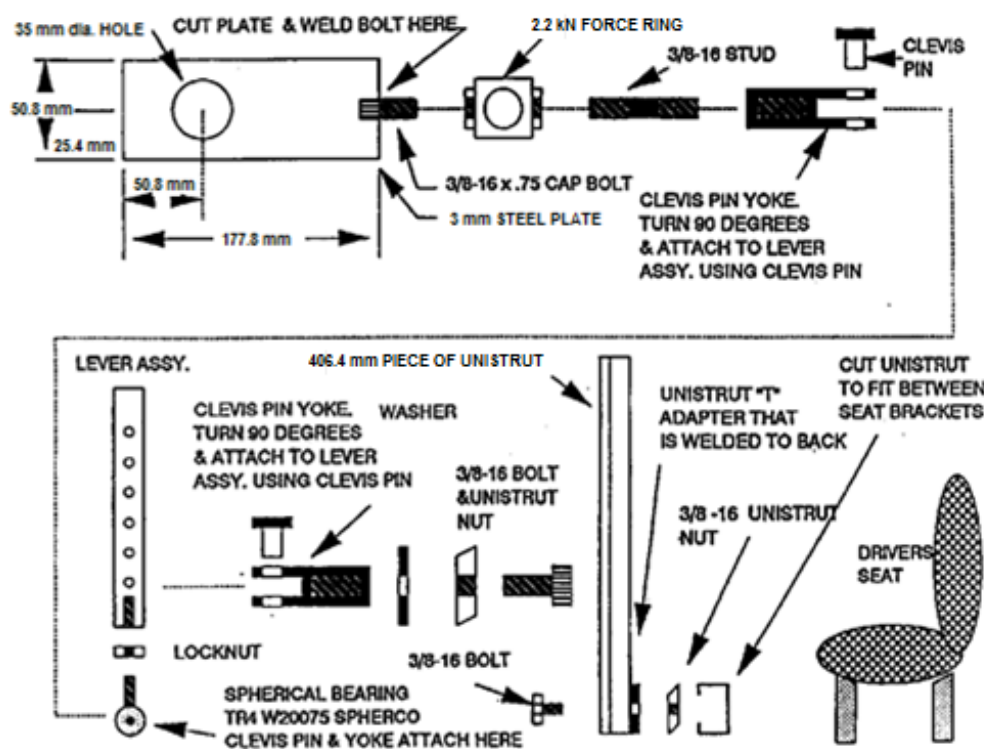


Figure 2: Weight Holder Assembly (not to scale)

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3.3 Test Vehicle/Test Piece.

3.3.1 Development tests may be performed on a test bench using several combinations of floor mat backs tested on several different carpet samples. This will enable the design engineer to select the best floor mat back to interface with the floor carpeting for the best performance prior to vehicle testing. At least three samples shall be tested or as specified by the Subsystem Validation Engineer. When available, floor mats must be tested with floor trim retainers engaged.

3.4 Test Time. Not applicable.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills.

3.6.1 Personnel should have working knowledge of the equipment required to perform the test.

3.6.2 Personnel skills will be required to input data into a computer spreadsheet and produce graphical plots.

4 Procedure

4.1 Preparation.

4.1.1 Carpet and floor mat preparation.

4.1.1.1 Driver's and Passenger's side carpets and floor pan areas must be thoroughly vacuumed prior to performing this procedure.

4.1.1.2 Floor mat backing must also be thoroughly cleaned before each test.

4.1.1.3 Floor mat should then be placed on carpet in floor pan area as designed.

4.1.2 Vehicle Information. Record the information requested on Data Sheet A1 (See Appendix A).

4.1.2.1 Determine mass of floor mat using weigh scale described in 3.2.8. Record the mass to the nearest gram on Data Sheet A1 (See Appendix A). A data sheet must be filled out per floor mat side (driver and passenger).

4.2 Conditions.

4.2.1 Environmental Conditions. Unless otherwise specified elsewhere in this document, tests shall be conducted at local relative humidity, and controlled room temperature of 23 ± 3 °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.

4.2.3 Floor pan and floor mat must be thoroughly dry prior to testing.

4.3 Instructions.

4.3.1 Floor Mat Torsional Torque Test.

4.3.1.1 Locate and attach three 25.4 cm (10 in) (approximate) strips of Velcro laterally in the "A" surface in the geometric center of the floor mat approximately 33 cm (13 in) in front of the driver's seat. It may be necessary to first locate the weight and fulcrum assembly on the floor mat to determine Velcro placement (Velcro strips are to adhere to the floor mat to correspond with a central placement of the weight holder onto the installed floor mat position). If the floor mat "A" surface design is not flat enough to adhesively attach the Velcro strips, use a different way to attach them such as mechanical attachment (i.e., staples) or a strip bed as shown in Figure 3.

4.3.1.2 Place the mating Velcro on the base of the weight holder assembly of the test fixture.

4.3.1.3 Weigh the weight holder assembly and record the value on Data Sheet A1 (See Appendix A). This weight will be added to the total test weight for plotting purposes.

4.3.1.4 Using a 9.07 kg (20 lb) barbell-type weight as described in 3.2.7, perform 4.3.1.4.1 thru 4.3.1.4.4 three times and record the results on Data Sheet A1 (See Appendix A).

4.3.1.4.1 Place the weight holder assembly on the center of the floor mat where the Velcro was placed in 4.3.1.1.

4.3.1.4.2 Place the weight on the weight holder assembly.

4.3.1.4.3 Place the 19 mm ($\frac{3}{4}$ in) socket of the torque wrench described in 3.2.4 on the weight holder. Zero the follow up pointer of the torque wrench. Hold the socket loosely with one hand and the handle of the torque

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Page 3 of 10

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