



Measurement of Floor Panel Stiffness

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 of local stiffness and oil canning of the floor panel segments.

1.2 Applicability. For all passenger cars, wagons, sport utility vehicles (SUV), trucks and vans.

1.3 Remarks.

1.3.1 Foot rest area, a load approximating an occupant's foot load while stretching or performing other maneuvers that impart a greater than normal load to the floor. This load is applied to the unsupported floor pan in the foot/heel rest areas to measure the stiffness of the panel. This test is typically performed on all foot/heel rest areas for all seating locations.

Note: Discuss with the requesting engineer, which locations are to be tested (typical van seating possibilities can be very complex).

1.3.2 Load floor or cargo storage area, a load approximating the load of light duty cargo such as; luggage, coolers, sport equipment, tools, landscaping supplies (bricks and sandbags), etc. This load is applied to the floor pan in the cargo areas of a wagon, van or sport utility, to measure the stiffness of the panel.

Note: Discuss with the requesting engineer, which locations are to be tested (commercial vans may require higher loads).

1.3.3 Oil canning can occur in the large flat unsupported portions of the footrest and cargo areas. Large beading patterns on flat panels can be used to prevent oil canning related squeaks and rattles.

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

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 Test plate (clamping plate 5 m x 3 m).

3.2.2 Eight (8) weight disks; 1 weight disk of 10 kg.

3.2.3 Eighteen (18) to 60 gauges (range 10 mm, accuracy 0.01 mm).

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3.2.4 Sixty (60) magnetic mounts.

3.2.5 Four (4) jack stands with vertical adjustment. In the case of a Body on Frame (BOF) vehicle, more than 4 jack stands may be necessary.

3.2.6 One (1) round loading board (Ø 100 mm) for testing the footrest area and 1 square loading board (300 mm x 300 mm) for testing the load floor or cargo area.

3.2.7 Measuring plates with fastening material plastilina.

3.3 Test Vehicle/Test Piece. Body in white (BIW), including floor reinforcement structure, such as tunnel straps, Instrument Panel straps that mount to the floor or any other structure that may provide stiffness to the floor area. The BIW should have gone through the production paint process, to cure any structural adhesives and sealers that may add to floor panel stiffness. This test does not require Front, Rear or Side Closures, steering cross-member, screw-mounted front cross-member (hard bolted), sub-frame, rear axle in vehicles with torsion bar suspension, bumper beams, tower braces, IP beam, radiator braces and all fixed glass, but if these panels or parts are present they need not be removed. All items added to the BIW will be noted on the test log sheet.

3.4 Test Time. Varies by program.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation.

4.1.1 Setting Up the Body.

4.1.1.1 For a Body Frame Integral (BFI), place the BIW on the test plate using the 4 jack stands. One (1) located at each the left hand and right hand Strut or Shock Tower and 1 located at each left hand and right hand rear kick-up rail (see Figure 1).

For a Body on Frame place the BIW on the test plate using a jack stand at each of the body mount locations. The body mount may need to be reinforced to prevent deformation.

4.1.1.2 Align the body horizontally with the aid of the jack stand vertical adjustment and a water level.

4.1.1.3 Insert the 100 mm diameter loading board in the center of the foot recess (see Figure 3). Use the 300 mm x 300 mm loading board for the cargo area.

4.1.1.4 Align the loading board horizontally.

4.1.1.5 Adapt the loading board to suit the shape of the foot recess or cargo area by means of polyester filler.

4.1.1.6 The loading boards shall be laying evenly on the underbody.

4.1.2 Positioning of the Gauges for the Foot Rest Area.

4.1.2.1 Locate the center point of the foot rest segment (gauge 7).

4.1.2.2 Determine the lateral centerline of the floor panel segment and divide into 6 parts; position gauges 5, 6, 7, 8, 9.

4.1.2.3 Determine the longitudinal centerline of the floor panel and divide into 6 parts; position gauges 1, 3, 11, 13.

4.1.2.4 Place 2 gauges on the rocker panel (gauges 2, 10).

4.1.2.5 Place 2 gauges on the tunnel/underbody junction (gauges 4, 12).

4.1.2.6 Place 2 gauges from above on the seat cross-member (gauges 14, 15).

4.1.2.7 For the rear floor panel, place 2 additional gauges from above on the kick-up (gauges 16, 17).

4.1.2.8 The position of the measuring points is illustrated in Figure 2.

4.1.3 Positioning of the Gauges for the Load Floor (Cargo Area).

4.1.3.1 Review the load floor area to determine the unsupported areas (areas that have no reinforcement structure or cross members). Each unsupported area shall be tested separately unless the areas are symmetrical in design (shape, bead patterns and material gauge). Depending on the size of the load floor, divide the floor panel into segments or sections of similar size as the footrest area. Locate the center point of the load floor segment.

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4.1.3.2 Determine the lateral centerline of the floor panel segment and divide into 6 parts; position gauges 5, 6, 7, 8, 9. Position the gauges similar as to those in the foot rest area.

Note: If this segment is large, divide it into more than 6 parts.

4.1.3.3 Determine the longitudinal centerline of the floor panel and divide into 6 parts; position gauges 1, 3, 11, 13. Position the gauges similar as to those in the foot rest area.

Note: If this segment is large, divide it into more than 6 parts.

4.2 Conditions.

4.2.1 Environmental Conditions. Not applicable.

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. The load shall be applied by means of a payload of weight disks, vertically to the center of the underbody segment being tested. The load shall be applied to each segment separately (see Figure 3).

Preloading before measurement shall not be necessary, since not only the elastic but also the plastic deformation of the underbody is to be recorded.

The load stages are identical for all 4 underbody segments and shall be as follows:

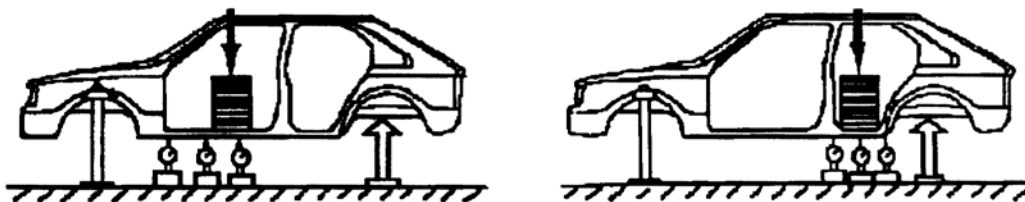
4.3.1 Twenty (20) kg payload.

4.3.2 Forty (40) kg payload.

4.3.3 Sixty (60) kg payload.

4.3.4 Eighty (80) kg payload.

4.3.5 Zero Measurement. At all measuring points, the values of displacements shall be recorded in each load stage and after relief from load (zero measurement).



Note: Load 20 kg - 40 kg - 60 kg - 80 kg

Figure 1: Setup of Body in White

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