GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW15747

Suspension Bushings - Dynamic Stiffness and Loss Angle Evaluation Procedure

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. The purpose of this procedure is to define the process of determining the dynamic stiffness and loss angle characteristics of elastomeric suspension bushings, see GMW14738.

1.2 Applicability. This test procedure is appropriate for use with all suspension bushings, including elastomeric, non-decoupled hydraulic mounts, and fixed decoupler hydraulic mounts. As new technologies evolve, additional requirements may be added.

1.3 Remarks. Mount dynamic stiffness and loss angle characteristics are key components in isolating noise and vibration of the road and powertrain from the vehicle interior.

2 References

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

2.1 External Standards/Specifications.

SAE J1085

2.2 GM Standards/Specifications.

GMW14738

2.3 Additional References.

- Component Technical Specification (CTS)
- Subsystem Technical Specification (SSTS)

3 Resources

3.1 Facilities. See GMW14738.

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. See GMW14738.

3.3 Test Vehicle/Test Piece. Suspension mount or bushing. Associated brackets are also desirable.

3.4 Test Time. Test time varies and is influenced by equipment, fixture availability, test conditions, and number of samples. Calendar time is intended to allow for fixture development.

Calendar time:	2 to 3 days
Test time:	4 to 8 hours
Coordination time:	1 to 2 hours

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3.5 Test Required Information. The following specific information is required for Suspension Mounts and Bushings to facilitate fixture development, test setup and data organization:

3.5.1 Number of test pieces.

3.5.2 In-vehicle location and orientation.

3.5.3 Outer sleeve diameter.

3.5.4 Outer sleeve length.

3.5.5 Inner sleeve inner diameter.

3.5.6 Test direction.

3.5.7 Mean Load (Preload) (and direction) (Newton(s) (N)) (-) compression/(+) tension.

3.5.8 Test Displacement(s) (peak-to-peak) (millimeters (mm)).

3.5.9 Test Frequency (or range) (Hertz (Hz)).

3.5.10 Test Frequency (step) (Hz).

3.5.11 Desired Report Format.

3.5.12 Desired Plots. The required information shall be submitted on the regionally approved test request form. For an example of the GM North America (GMNA) form, see Appendix A, Table A1.

3.6 Personnel/Skills. See GMW14738.

4 Procedure

4.1 Preparation. See GMW14738.

Note: The mass of the fixture located on the stationary platen shall be minimized to reduce errors due to mass-inertia accelerations. The fixture located on the moving platen shall be rigid to eliminate any possibility of structural resonance near operating frequencies. More specific guidance for the development of appropriate test fixtures is included in GMW14738.

4.2 Conditions.

4.2.1 Environmental Conditions. See GMW14738.

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.

4.2.2.1 Suspension Mounts and Bushings. Recommended test conditions for Suspension Mounts and Bushings are documented in Appendix B, Table B1.

4.3 Instructions. See GMW14738.

Note: If static and dynamic rates are to be tested, perform the static testing first. For reference, recommended static test conditions are listed in Appendix C, Table C1.

5 Data

5.1 Calculations. See GMW14738.

5.2 Interpretation of Results. Results should be reviewed to ensure that they are characteristic of the part design. Unexpected variation in rate, damping, or phase angle could indicate errors associated with test fixtures or procedure.

The results from 5.1 should satisfy the CTS/SSTS requirement.

5.3 Test Documentation. The result of this test is a plot of dynamic stiffness and loss angle (damping) versus frequency for each test condition, see GMW14738.

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