GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW16276

Strut Top Mount Bearing Performance to Cyclic Spring Loads

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. To verify structural performance for strut top mount bearing assemblies when subjected to cyclic spring loading. If measured torque increases during testing, it is an indication of contact between rotating and non-rotating components.

1.2 Applicability. This procedure will apply to all passenger vehicles using McPherson front suspensions.

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.

Math model data or suspension layout prints of in vehicle orientation of the strut assembly including curb, maximum jounce and full rebound positions from Design Release Engineer.

3 Resources

3.1 Facilities. The facility must be of adequate size to house the test equipment. Due to test complexity and likely associated cost, it is recommended to perform this test within GM test 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 Corner suspension test (in suspension geometry) that includes cyclic wheel displacement for suspension jounce-to-rebound travel with strut assembly rotation.

3.2.2 Test equipment must be capable of measuring strut rotating torque for ± 10 degrees of strut rotation while holding suspension at curb position.

3.2.3 Equipment must have actuator capacity capable of achieving 2 Hz frequency for corner suspension cycled from full rebound to full jounce, and 1.5 Hz frequency for applying ± 30 degrees steering angle. Lower test speeds are acceptable if required.

3.3 Test Vehicle/Test Piece. This test is to evaluate structural performance using new/unused strut mount assembly hardware. Also recommend using new lower ball joint (Lower Control Arm (LCA)) for each mount test because ball joint torque is included with strut torque measurement.

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3.4 Test Time.

Calendar time:	20 days
Test hours:	450 hours
Coordination hours:	8 hours

3.5 Test Required Information. In vehicle orientation of the strut assembly for the vehicle application(s) being tested, preferably math model or suspension layout prints.

3.6 Personnel/Skills. Addition of measured torque adds complexity to this test setup. Formal technician skills necessary.

4 Procedure

4.1 Preparation. Measure bearing assembly static load vs. displacement in same direction as spring side load is applied (generally inboard). Be sure to mark the bearing assembly and install in vehicle orientation. Repeat this measurement at end of test.

4.2 Conditions.

4.2.1 Environmental Conditions. Laboratory ambient conditions.

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.

Note: Torque measurements will generally be < 5 N·m.

Note: Run enough samples to ensure B5 (Weibull Reliability of 95% with a 50% confidence interval) minimum of 750 000 cycles.

4.3.1 Install top mount assembly test hardware into strut module, then install strut module into corner-car test rig. Reference Figures A1 and A2 (Appendix A). Stroke for 100 cycles of full suspension travel (2 Hz) while also rotating strut ± 30 degrees at 1.5 Hz.

4.3.2 After 100 cycle break-in, hold suspension in straight ahead curb position and measure torque to rotate strut between ± 10 degrees of strut rotation.

4.3.3 Compress strut assembly to 85% of maximum jounce (85% of suspension travel from curb to maximum jounce). Hold for 24 h. (This is equivalent to 24 h static load exposure for a typical haul-away truck vehicle transport event.)

4.3.4 With suspension in curb position, re-measure torque to rotate strut between ± 10 degrees of strut rotation.

4.3.5 Document results.

- **Successful test result:** Measured torque no higher than measured at pretest (4.3.1).
- **Unsuccessful test result:** Any strut bearing noise during steering, or a higher torque than measured prior to start of test.

4.3.6 Cycle strut from 85% of jounce (85% of jounce travel from curb to maximum jounce) to full rebound 25 000 cycles (2 Hz) with steering input from ± 30 degrees of strut rotation (1.5 Hz).

4.3.7 Move suspension into straight-ahead curb position and re-measure for torque-to-rotate strut through ± 10 degrees of strut rotation.

4.3.8 Repeat torque measurement after every 25 000 cycles of jounce-to-rebound travel.

4.3.9 Document results.

- **Successful test result:** Measured torque does not increase with additional load cycles. **Note:** It is desired that measured torque should hold constant or trend lower with additional wear.
- **Unsuccessful test result:** Measured torque increases with additional load cycles. **Note:** It is recommended that measure torque shall not increase before a minimum B5 of 750 000 load cycles are observed. Increased measured torque may be an indication that rotating and non-rotating components are coming into contact.

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