



Strut Top Mount Noise Evaluation to Rod Coning

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 quiet, robust performance of front strut top mount assemblies when subjected to moisture and cold temperature while steering.

The noise mechanism is strut rod coning relative to the top mount. Refer to Figure A3 (Appendix A) for definition of strut rod coning. Strut rod coning occurs during steering and suspension travel. Top mount assembly to be evaluated includes top mount, jounce bumper, boot (if secured between jounce bumper and cup), jounce bumper cup, and rate washers.

1.2 Applicability. This procedure will apply to all passenger vehicles using MacPherson type 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

3 Resources

3.1 Facilities. The facility must be of adequate size to house the test equipment.

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 Access to cold chamber where top mount assemblies can be cold-soaked to -30 °C. Alternate test temperature must be approved by GM Engineering.

3.2.2 Standard bench vice (or similar), or rigid fixture that accepts bolted top mount, is required to hold mounts stationary during noise evaluation.

3.2.3 No special measurement equipment required. Noise evaluation can be made subjectively by GM and Supplier Engineers.

3.3 Test Vehicle/Test Piece. Perform evaluation using at least two (2) pieces of each part number, from each top mount supplier manufacturing location. Perform this evaluation for Mule, Integration and Production Validation. New (unused) parts as well as vehicle end-of-test parts must be evaluated.

3.4 Test Time.

Calendar time: 2 days
Test hours: 4 hours
Coordination hours: 2 hours

3.5 Test Required Information.

 Not applicable.

3.6 Personnel/Skills. Technician should be a person familiar with chassis/suspension testing. It is recommended to have GM Product Engineer in attendance to make formal acceptance evaluation.

4 Procedure

Note: Cold Soak Evaluation.

4.1 Preparation.

4.1.1 Attach strut mount components to strut rod (or substitute rod about the same length as strut rod): mount assembly, jounce bumper, jounce bumper cup, strut rod, dust boot (if secured between bumper and jounce bumper cup), and jounce bumper cup. Cold soak assembly to -30 °C for 4 h. Refer to Appendix A for setup.

4.2 Conditions.

4.2.1 Environmental Conditions. Environment must be reasonably quiet to hear possible top mount noises. Noise evaluation may be performed in ambient temperature 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.

4.3.1 Remove complete top mount assembly from cold soak chamber. Work quickly to finish evaluation within 5 minutes of removing hardware from cold chamber. Be sure jounce bumper is pressed against strut mount (or flat surface of jounce bumper cup).

4.3.2 Secure single point attachment top mount in standard bench vice, allowing room for full rod/mount coning of at least 8 degrees. Bolted attachment top mounts may be secured using vice or by using bolted attachments.

4.3.3 With mount secured (e.g., clamped in vice), supplier technician or GM engineer must push/pull on end of tenon rod to exercise top mount through at least ± 8 degrees of coning. Cone rod relative to mount in all directions, if space allows. Prefer to cone rod until hard stop is encountered. Refer to Appendix A (Evaluation Procedure). Rate of coning: approximately 0 degrees to 8 degrees in 1 s to 2 s. (Approximation is acceptable, measurements not necessary.)

4.3.4 Listen for any noises as rod is coned relative to top mount assembly. Noise may occur at any interface that experiences relative movement (e.g., internal rubber bushing to steel cage).

4.3.5 Vehicle performance verification is highly recommended for new and post-durability test hardware (recommend evaluating two pieces of each Part Number (PN) from each mount manufacturing location). This GMW provides an opportunity to identify top mount noise issues before hardware is installed onto saleable vehicles. However, this GMW does not address all environmental exposures the hardware will see in service, nor does it include dynamic rod movement (e.g., possible stick-slip between bumper and rod).

4.3.6 Record Observations (refer to Table B1, Appendix B).

4.3.7 Wet Evaluation. Allow hardware to obtain room temperature. Spray water on rubber mount, trying to wet all rubber and jounce bumper surfaces. Pull dust boot out of jounce bumper cup in order to wet all dust boot interface surfaces. Reinstall dust boot into jounce bumper cup. Be sure jounce bumper is pressed against strut mount (or flat surface of jounce bumper cup).

4.3.8 With mount assembly secured (e.g., clamped in vice), technician (or GM engineer) must push/pull on end of tenon rod to exercise top mount through at least ± 8 degrees of coning. Rotate rod relative to mount in all directions if space allows. Prefer to cone rod until hard stop is encountered. Refer to Appendix A (Evaluation Procedure). Rate of coning: approximately 0 degrees to 8 degrees in 1 s to 2 s. (Approximation is acceptable, measurements not necessary.)

4.3.9 Listen for any noises as rod is coned relative to top mount assembly. Noise may occur at any interface that experiences relative movement (e.g., internal rubber bushing to steel structure).