



Squeak and Rattle Degradation (Subassembly, Subsystem and Component) 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. To provide a means of performing Squeak and Rattle (S&R) diagnostics or subjectively evaluating subassemblies, subsystems or components for squeak and rattle performance relative to vibration degradation over normal life expectancy. A subjective evaluation per GMW7293 is recommended, but not required.

1.2 Applicability. This procedure is applicable to any automotive subassembly, subsystem or component where squeaks and rattles are a concern and the vibration environment can be simulated.

1.3 Remarks. This degradation test is based on MIL-STD-810 which states the total test time may be exponentially reduced relative to a linear increase in test load. The relationship between test time and load is governed by the equation explained in Appendix A, Section A1.

This test is limited to degrading a subassembly, subsystem or component due to random simulated road vibration inputs only. It does not address environmental effects, static load effects, or customer actuated inputs.

Refer to the Squeak and Rattle website for the "Complete Multi-axis Vibration Tables" to find the vibration test profiles.

All evaluations called for in this procedure are documented in GMW7293 and GMW14264 and should be performed in accord with GMW7293 and GMW14264.

For additional background information, refer to the following sources: "Subsystem Squeak and Rattle Degradation Test" by Robert S. Brines, GM Noise and Vibration Center, and "Automotive Component Vibration: A Practical Approach to Accelerated Vibration Durability Testing" by George Shinkle, Delco Remy.

2 References

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

2.1 External Standards/Specifications.

MIL-STD-810

2.2 GM Standards/Specifications.

GMW7293

GMW14011

GMW14264

2.3 Additional References.

- Brines, Robert S. (2002). *Evaluation Report: Squeak and Rattle (S & R) Subsystem Degradation Test*, Document Number 05072002-OT14-BQAC (ID), Available at: (<https://documents.naeng.gm.com/gdm3/drl/objectId/090163bc80596bf7/chronicleId/090163bc80596bf7>)
- Shinkle, George A. (1984). *Automotive Component Vibration: A Practical Approach to Accelerated Vibration Durability Testing*, SAE International Paper Number: 840501, (<http://papers.sae.org/840501>)
- Squeak and Rattle website: <https://gmweb.gm.com/engineering/GNVC/Pages/SqueakRattle.aspx> (ID)

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Page 1 of 6



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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. Information wholly contained in GMW7293.

3.3 Test Vehicle/Test Piece. Information wholly contained in GMW7293.

3.4 Test Time.

Calendar time: 1 day to 12 days

Test hours: 4 hours to 96 hours

Coordination hours: 1 hour to 8 hours

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Information wholly contained in GMW7293.

4 Procedure

4.1 Preparation.

4.1.1 Fixturing Part. Information wholly contained in GMW7293.

4.1.2 Random Controller Setup. Information wholly contained in GMW7293.

4.1.3 Determining Test Level Multiplier. Determine the test level multiplier and test time from Appendix A (Section A1). Caution must be exercised to avoid choosing too high of a test level multiplier, which may cause an unrealistic failure. Instrument panels should not be tested at an increased level. Multiplier for other subsystems shall be specified by the validation engineer.

4.2 Conditions.

4.2.1 Environmental Conditions. Information wholly contained in GMW7293.

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. It is recommended, that a subjective evaluation, per GMW7293, be conducted prior to testing in order to establish a baseline performance level. Use the vibration profile specified in the "Complete Multi-Axis Vibration Tables" on the Squeak and Rattle website.

4.3.1 Select the test level multiplier and test time per 4.1.3. Multiply the vibration Power Spectral Density (PSD) acceleration levels from the vibration test profile by the test level multiplier. (This means that Root Mean Square (RMS) level will increase by a factor of the square root of the multiplier.)

4.3.2 Perform the degradation test for 100% of the total test time. Conduct an objective evaluation at the end of test per GMW14011.

Note: The presence of witness marks or wear marks may assist in locating the source of Squeak and Rattle Issues.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation. Document the results of all evaluations per the instructions in GMW7293, also noting the test level and the elapsed test time for each evaluation.

6 Safety

This Engineering Standard may involve safety requirements for hazardous materials, the method of operations and equipment. This standard does not propose to address all the safety issues associated with its use. It is the

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August 2016

Page 2 of 6