



Power-Based Noise Reduction (PBNR) 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 measure the power-based noise reduction (PBNR) tests of a full vehicle.

1.2 Applicability. This procedure applies to all passenger vehicles. This procedure can be used for development and/or validation of the PBNR of fully trimmed vehicles.

1.3 Remarks. Wholly contained in GMW14174.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW14174

2.3 Additional References.

Subsystem Technical Specification (SSTS)

3 Resources

3.1 Facilities. Wholly contained in GMW14174.

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. Wholly contained in GMW14174.

3.2.1 Volume Velocity Source. One (1) or more volume velocity sources that span a frequency range of interest.

3.3 Test Vehicle/Test Piece. A fully trimmed vehicle with production intent sealing is required.

3.4 Test Time.

Calendar time: 1 day

Test time: 6 hours

Coordination time: 2 hours

3.5 Test Required Information. Wholly contained in GMW14174.

3.6 Personnel/Skills. Wholly contained in GMW14174.

4 Procedure

4.1 Preparation. Wholly contained in GMW14174.

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4.2 Conditions.

4.2.1 Environmental Conditions. Wholly contained in GMW14174.

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. Wholly contained in GMW14174.

4.3.1 Measurement Location. Determine which locations are used for the requirement you are evaluating (e.g., for the body power based noise reductions, Right Front Seat (RFS) to Engine Rear, the operator will use the right front seat location and the Engine Rear volume). Place the microphone(s) in the volume specified by the requirement being evaluated. For a requirement referencing the engine, all 6 (six) faces must be measured. Place the source in the volume specified by the requirement being evaluated. For the number of points to measure inside the specified volume see Appendix A, Table A1.

4.3.2 Data Acquisition. Wholly contained in GMW14174. Note that the frequency range is defined by the source.

5 Data

5.1 Calculations. Wholly contained in GMW14174.

5.2 Interpretation of Results. Verify whether SSTS requirements are achieved, when appropriate.

5.3 Test Documentation. The data shall be recorded in $\frac{1}{3}$ octave bands.

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 responsibility of the user of this standard to ensure compliance with all appropriate safety and health practices. This would include any specific training that may be required. The safety and health standards include site specific rules and procedures, company rules and procedures, and Government Standards. Contact shall be made with the appropriate site Safety and Health personnel for further direction and guidance in these matters.

7 Notes

7.1 Glossary.

Engine Faces: The plane parallel to the side of the engine being referenced. The volume is the space between the faces of the engine and the outer wall of the engine compartment, the hood and floor (see Appendix B, Figure B1):

1. Engine Front
2. Engine Rear
3. Engine Left
4. Engine Right
5. Engine Top
6. Engine Bottom

Note: If the vehicle has a belly pan or splash shield which covers the engine, the microphones should be placed between the belly pan/splash shield and the bottom surface of the engine making sure the microphones do not touch the shield or the engine when the shield is reinstalled. For vehicles with partial coverage undershielding, use an approximate engine coverage area weighted microphone array. That is, for an engine bottom that is about 70% covered and 30% open, 4 (four) of the 6 (six) microphones should be located between the undershielding and the engine and 2 (two) of the 6 (six) should be placed where the engine is open.

Exhaust Pipe: The fixed position at 5 mm outwards of the center point of the exhaust pipe (see Appendix D, Figure D1). If the vehicle does not have dual exhaust locations, utilize symmetry to measure the same point on the opposite side of the exhaust pipe. Noise blocking material should be placed over the opening of the exhaust pipe in order to control pipe resonances that may influence the noise measurement.

1. Left Exhaust
2. Right Exhaust

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Induction/Snorkel (Optional): The fixed position 10 cm measured from 45 degrees from the center point of the snorkel. Each snorkel inlet location shall be measured.

Rear Compartment: The volume behind the last row of seats. Applicable only to those vehicles where the rear compartment is closed off from the passenger compartment (i.e., sedans).

1. Rear Compartment Left
2. Rear Compartment Right

Tire Patch: The volume directly in front of and behind the tire road interface 100 mm above the ground (see Appendix C, Figures C1 and C2):

1. Right Front Tire
2. Left Front Tire
3. Right Rear Tire
4. Left Rear Tire

Tunnel: Applies to AWD and RWD vehicles where the transmission is oriented in a longitudinal fashion. The volume is the space between the tunnel sheet metal and the transmission casing (see Appendix E, Figures E1 and E2):

1. Tunnel Left
2. Tunnel Right

7.2 Acronyms, Abbreviations, and Symbols.

ABN	Airborne Noise
IDSR	Integration Driven Subsystem Requirements
LFS	Left Front Seat
LRS	Left Rear Seat
mic	microphone
N&V	Noise and Vibration
PBNR	Power-Based Noise Reduction
RFS	Right Front Seat
RRS	Right Rear Seat
Trans	Transmission
VPO	Vehicle Performance Owner

8 Coding System

This standard shall be referenced in other documents, drawings, etc., as follows:

Test to GMW14175

9 Release and Revisions

This standard was originated in June 2005. It was first approved by the Global N&V Acoustic & ABN IDSR Harmonization Team in October 2005. It was first published in October 2005.

Issue	Publication Date	Description (Organization)
1	OCT 2005	Initial publication.
2	MAR 2011	Reviewed and updated this procedure to comply with five year refresh. (Global N&V Airborne Noise VPO Team)
3	SEP 2016	Revised to current template. (Global N&V ABN VPO Team)

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