



Exhaust System - Radiated Sound Pressure Level (SPL) 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 record exhaust system radiated noise for the purpose of validation of the exhaust system radiated noise performance requirement in the GM Exhaust SSTs. Provide subsystem data for use in developing a vehicle to meet exterior noise requirements (pass-by) and interior noise requirements. To provide subsystem data for use in developing a vehicle to meet vehicle level interior noise levels during a drive-away wide open throttle event

1.2 Applicability. This test procedure is appropriate for use with all cars and trucks, see GMW14227.

1.3 Remarks. Exhaust system radiated noise is an important factor in the level of pass-by noise as well as interior noise.

2 References

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

2.1 External Standards/Specifications.

IEC 61672-1

2.2 GM Standards/Specifications.

GMW14227

GMW14218

GMW16178

2.3 Additional References.

- ETAS hardware and INCA software are available at www.etas.com/en/index.php
- Subsystem Technical Specification (SSTs) - Exhaust
- Vspy software, available from Information Technology (IT) group or Milford Proving Grounds (MPG) Building 94 chassis rolls test office or drive quality group (contact the GM Lead Engineer for further instructions).

3 Resources

3.1 Facilities. A chassis dynamometer test facility, see GMW14227.

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. Free-field or pressure microphones, with flat response between 3.15 Hz to 10 kHz and appropriate signal conditioning and cables, meeting Class 1 requirements corresponding to IEC 61672-1, or equivalent for the application shall be used.

3.3 Test Vehicle/Test Piece. Fully dressed vehicle, see GMW14227 and GMW16178.

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3.4 Test Time.

Calendar time: 1 d

Test time: 8 h

Coordination time: 2 h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. One (1) qualified engineer or technician trained in the use of data acquisition equipment and having basic knowledge of acoustic and vibration signal processing. One (1) qualified engineer or technician familiar with ETAS/INCA hardware/software and/or Vspy software (see 2.3). One (1) qualified chassis dynamometer operator.

4 Procedure

Follow the procedure outlined in GMW14218 with the following additions:

4.1 Preparation.

4.1.1 Vehicle Preparation on Chassis Dynamometer. Use a remote tailpipe silencer to silence the tailpipe noise without adding backpressure. Verify that the engine torque and chassis dynamometer force remain the same as without the remote silencing system installed. Use acoustic dynamometer roll covers to reduce airborne tire noise contamination of data. Blank treaded tires can also reduce radiated tire noise but acoustic roll covers are preferable. The movable floor should be raised to ground height. Place a noise barrier under the vehicle rearward of the engine, forward of the exhaust components, to reduce the effect of engine noise on the measurements. See Appendix A, Figures A1 and A2 for examples.

4.2 Conditions. See GMW14218 and GMW16178 paragraphs on Exhaust System.

4.2.1 Environmental Conditions. See GMW14218 and GMW16178.

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 Calibration Verification. Verify calibration of the transducers as specified in GMW16178. Record calibration tone prior to and immediately after the test measurement sequence. Record calibration values and gain settings.

4.3.2 Install Data Acquisition Equipment. Set up data acquisition system (DAS) and engine tachometer probe according to GMW16178.

- A microphone should be placed 0.05 m away from the center of the bottom side of each muffler and resonator.
- A microphone should be placed 0.05 m away from the end caps of each muffler and resonator.
- Do not measure exhaust after treatment components (catalysts) due to thermal concerns. All mufflers and resonators should be measured. Do not use a wind sock/foam ball on the microphone. See Figure 1 and Figure 2.

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