



Heat Shield Test (Resonance and Durability)

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. Identification of the natural frequency and the durability by a laboratory test.

1.2 Applicability. Exhaust heat deflector shields which are mounted to body or to engine components (e.g., tunnel heat deflector shield, exhaust collector heat shield).

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3059

2.3 Additional References

- Component Technical Specification (CTS)
- Subsystem Technical Specification (SSTS)
- Vehicle Technical Specification (VTS)

3 Test Preparation and Evaluation

3.1 Resources.

3.1.1 Facilities. Electrodynamics shaker with a closed loop oscillating control system and analyses system. The testing facility shall be suitable for a frequency range from 1 Hz to 2000 Hz (sine).

The testing facility shall have a valid ISO Certificate, which shall be documented in the test protocol.

3.1.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.1.2 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.

3.1.2 Equipment.

3.1.2.1 Weight reduced test part fixture to reproduce the original heat deflector connection. The adaptation of the test parts shall not influence the connection of the heat deflector shields. Natural vibration behavior of the test part adapter shall be eliminated. The test part fixture shall be mounted centrally on the shaking table.

3.1.2.2 Acceleration sensors with an effective range from 1 m/s² to 1000 m/s².

3.1.2.3 Torque wrench with an effective range from 0.5 N·m to 10 N·m.

3.1.3 Test Vehicle/Test Piece. The test shall be performed with at least five (5) new samples. The test parts shall have been manufactured according to the approved drawings. To make sure defined stiffness at the attachment points, the attachment shall take place with the original elements according to drawing. Body panels shall be replaced by fixture parts considering the car specific contact surfaces.

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January 2016

Page 1 of 5



Documents

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3.1.4 Test Time. The following is an estimate of the amount of time needed to perform this procedure. These time estimates are approximate and may vary based on the type of test rig and test development methodology used. These times include preparation, planned downtime, actual test, and analysis of data in capturing a total calendar time. Report writing is not included as part of these times.

Test Fixture Design/Build:	2 weeks to 3 weeks
Data Processing/Test Development:	1 week
Durability Test (Car):	2 days
Durability Test (Mid-Size Truck):	2 days
Durability Test (Full Size Truck):	2 days

3.1.5 Test Required Information. Excitation profile (see Table 1 and Table 2).

3.1.6 Personnel/Skills. Not applicable.

3.2 Preparation. The test setup depends on the mounting strategy specified in Appendix N of the SOR. See Figure 1.

Figure 1: Exemplary Test Setup for Heat Reflection Shields



3.3 Conditions.

3.3.1 Environmental Conditions. The test shall be accomplished with a temperature of $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

3.3.2 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.

3.4 Instructions. Not applicable.

3.5 Data.

3.5.1 Calculations. In order to get as safe a statement as possible for the life time, a comparison between test cycles and reliability and confidence value (see SSTs) is needed. Furthermore analysis with the method for survival probability according to the lognormal distribution shall take place.

3.5.2 Interpretation of Results. The acquired results shall be compared with the input of the SSTs and shall be evaluated accordingly.

3.5.3 Test Documentation. The results shall be documented in a test report, according to the guidelines in paragraph 3.5.1 and paragraphs 3.5.3.1 through 3.5.3.2.

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Page 2 of 5