



Transfer Case Range Clunk Test 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. This test procedure is intended to measure the level of noise present during a range shift.

1.2 Applicability. This standard is applicable to all two speed transfer cases.

1.3 Remarks. The primary intent of this test is to provide measurable effect the transfer case range shift will have on customers both inside and outside a vehicle.

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

2.3 Additional References.

HEAD acoustics, Incorporated, <http://www.head-acoustics.de>

3 Resources

3.1 Facilities. Semi-anechoic test chamber.

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 Binaural head and related recording equipment (i.e., Aachen HEAD, available through HEAD acoustics, Incorporated).

3.3 Test Vehicle/Test Piece. Representative vehicle at any level. Note vehicle level in test report.

3.4 Test Time.

Calendar time: 1 day

Test hours: 1 hour

Coordination hours: Not applicable

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. A driver/technician or engineer should conduct this test evaluation who is able to maneuver the vehicle according to the driving sequences listed herein and induce behavior on test vehicle for the purposes of evaluating the response. In addition, a person who has the ability to conduct end of test inspection of test parts if required.

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4 Procedure

4.1 Preparation.

4.1.1 Place vehicle in center of anechoic chamber.

4.1.2 Place vehicle transmission gear selector in neutral. Stabilize the vehicle with the parking brake.

4.1.3 Adjust driver's seat to the highest vertical position and maximum rearward position.

4.1.4 Accessories off.

4.1.5 Windows up.

4.2 Conditions.

4.2.1 **Environmental Conditions.** This test shall be run at ambient room temperature with vehicle at ambient room temperature.

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 Interior.

4.3.1.1 Place binaural head in driver's seat.

4.3.1.2 Measure (at the driver's right ear) six (6) shifts from **HI** range to **LOW** range and six (6) shifts from **LOW** range to **HI** range.

4.3.2 Exterior.

4.3.2.1 Place binaural head on the floor of the test chamber, facing the driver's door, with right edge of right ear lined up with the rear edge of the driver's door. The center of the ear shall be 46 cm (18 in) from the driver's door.

4.3.2.2 Measure six (6) shifts from **HI** range to **LOW** range and six (6) shifts from **LOW** range to **HI** range.

5 Data

5.1 **Calculations.** Data is presented as maximum, minimum, and average sound loudness values at driver's right side ear in sones.

Using Advanced Research Technology for Measurement and Investigation of Sound and Vibration (Artemis) sound analysis software (available through HEAD acoustics, Incorporated), generate loudness vs. time chart, and manually read the peak amplitudes of **4HI** range to **4LOW** range shift and **4LOW** range to **4HI** range shifts using the cursor. Post-process the readings in Microsoft Excel to determine maximum, minimum, and average values of loudness in sones and plot the maximum, minimum, and average values for both interior and exterior loudness in Excel.

5.2 **Interpretation of Results.** The level of noise measured shall meet or exceed the requirements of the relevant Subsystem Technical Specification (SSTS).

5.3 **Test Documentation.** Empirical data shall be added to a test report with reference to this standard.

6 Safety

This standard may involve hazardous materials, operations, and equipment. This standard does not propose to address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

7 Notes

7.1 Glossary.

Aachen HEAD: A binaural recording transducer which correctly reproduces the human auditory transfer function, available through HEAD acoustics, Incorporated.

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