



Shift Lever Shake and Gear Jump Out (dynamic)

1 Scope

Note: Nothing in this standard supersedes 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. Evaluation of shift lever movement and gear-detents on vehicles with manual transmission.

1.2 Foreword. This standard was formerly known as GME R-7-3.

1.3 Applicability. This standard is applicable for testing all FWD, AWD and RWD transmission.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW14264

3 Resources

3.1 Facilities.

3.1.1 The standard is based on the tracks available at Dudenhofen Proving Ground, Germany (see Appendix B).

Note: Other proving grounds with corresponding specifications may be used.

3.1.1.1 German Block Track. Right Hand side on durability track (as shown in Appendix B).

3.1.1.2 Belgian Block Track.

3.1.1.3 Washboard Track. See paragraph 7.1.3.

3.2 Equipment.

3.2.1 Cyclic counter.

3.2.2 Writing material.

3.2.3 Ballast bags.

3.2.4 Axle scale for measurement of vehicle load conditions (see paragraph 4.2.2).

3.2.5 Thermocouple for transmission oil temperature measurement.

3.3 Test Vehicle/Test Piece.

3.3.1 Test vehicle with a clutch and manual transmission as approved or as ordered. Enter this data into the data sheet (see Appendix A).

3.3.2 Test vehicle with the strongest engine that is approved for its Powertrain or relevant engine type to be checked. Enter this data into the data sheet (see Appendix A).

3.3.3 Engine mounts as approved or ordered with its parameters enclosed. Enter this data into the data sheet (see Appendix A).

3.4 Test Time.

Calendar time: 5 days

Test hours: 9 hours

Coordination hours: 3 hours

3.5 Test Required Information. Possible sources are:

- SOR
- VTS
- SSTS
- ADV Plan
- VCRI
- Application engineer
- Development Groups
- Drawings

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation.

4.1.1 Shifter adjustment shall be checked as approved and adjusted, if needed.

4.1.2 Chassis equipment shall be tested for Release Status. (shock absorbers, springs, stabilizer, etc.).

4.1.3 Tire pressure shall be tested according to operating conditions, pay load and adjusted, if needed.

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Page 1 of 7

Documents

Document Sharing Hub



4.1.4 The vehicle shall be refuelled, engine oil- and radiator coolant level shall be checked and adjusted, if needed.

4.1.5 Fit a thermocouple inside the car on the gearbox oil cap for oil temperature measurement.

4.2 Conditions.

4.2.1 Environmental Conditions. The test shall be performed on dry road conditions.

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.

4.2.2.1 The test shall be completed with the following load:

4.2.2.1.1 One person for items described in paragraph 4.3.1 through 4.3.4.

4.2.2.1.2 Gross weight (GVWR) for items described in paragraph 4.3.1 through 4.3.4.

4.2.2.2 During the test as described in paragraph 4.3 the transmission oil shall have a temperature of $(+65 \pm 3) ^\circ\text{C}$.

4.3 Instructions.

4.3.1 German Block (RHS). Track length shall be 1.8 km. For road track see Appendix B, for data sheet see Appendix A, paragraph A1.1.

4.3.1.1 Try to reach the most critical driving speed (definitions according to paragraph 7.1.2) with maximum of shift lever movement for the 1st, 2nd, 3rd and 4th gear on German Block on RHS of track.

4.3.1.2 Drive 5 laps in each gear (1st – 4th) on RHS of German Block Track, with changing speed and torque (drive / float / coast) near the most critical driving speed (see paragraph 7.1.2).

4.3.1.3 Evaluate movement of the shift-lever at each gear subjectively including gear jump-outs that could occur, using Subjective Rating Scale (according to GMW14264).

4.3.2 Belgian Block Track (length 300 m).

4.3.2.1 Drive along the Belgian Block Track 8 times, each in 1st, 2nd and 3rd gear with changing torque (drive / float / coast) up to 30 km/h max. speed. For data sheet see Appendix A, paragraph A1.2.

4.3.2.2 Cooling. Perform cooling cycle (see paragraph 4.3.5) after each 4th cycle described in paragraph 4.3.2.1.

4.3.2.3 Evaluate movement of the shift-lever at each gear subjectively including gear jump-outs that could occur, using Subjective Rating Scale (according to GMW14264).

4.3.3 Washboard Track (length 300 m).

4.3.3.1 Drive along the Parallel Wave Track 8 times, each in 1st, 2nd and 3rd gear with changing torque (drive / float / coast) up to resonant condition of shift lever or 40 km/h max. speed. For data sheet see Appendix A, paragraph A1.3.

4.3.3.2 Cooling. Perform cooling cycle (see paragraph 4.3.5) after each 4th cycle described in paragraph 4.3.3.1.

4.3.3.3 Evaluate movement of the shift-lever at each gear subjectively including gear jump-outs that could occur, Subjective Rating Scale (according to GMW14264).

4.3.4 Speed Bump.

4.3.4.1 Accelerate towards the washboard track up to 40 km/h, press clutch pedal and pass washboard track in overrun (coast) condition. Repeat test with various reduced vehicle speeds and find out the most critical speed (see paragraph 7.1.2). Then drive 8 times each in 1st, 2nd and 3rd gear.

4.3.4.2 Cooling. Perform cooling cycle (see paragraph 4.3.5) after each 4th cycle described in paragraph 4.3.4.1.

4.3.4.3 Evaluate movement of the shift-lever at each gear subjectively including gear jump-outs that could occur, using Subjective Rating Scale (according to GMW14264).

4.3.4.3 Pass speed bump with reasonable speed. Size of speed bump and vehicle speed shall be recorded in the datasheet (see Appendix A, paragraph A1.4).

4.3.5 Cooling Down. Perform by normal driving mode at a speed of $\approx (100 \text{ to } 120) \text{ km/h}$ on the High-speed Track (Dudenhofen Proving Ground) or equivalent proving ground track /or public road for a length of $\approx 10 \text{ km}$ to cool down the damping system of chassis.

5 Data

5.1 Calculations. The test outputs are subjective evaluations and temperature measurements only.

5.2 Interpretation of Results. Unless otherwise specified in SSTS/VTs the target is fulfilled when:

- Not more than one (1) gear jump out during cycles required (see paragraph 4.3) occur
- Evaluation of shift lever movement is not lower than Rating 7 according to GMW14264

5.3 Test Documentation. The test outputs shall be noted in datasheets as provided in Appendix A.

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July 2011

Page 2 of 7

Documents

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With reference to this Test Procedure the test results shall be represented in a test report.

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, corporate 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.

7.1.1 Shift Lever Movement/Shift Lever Shake. Visible movement of shift lever knob at different driving conditions, initiated by:

- relative motion between Powertrain and fix-points of external shift control
- extra travel out of transmission and ext. shift control at load reversal or combinations of both.

7.1.2 Most Critical Driving Speed. Most shifter movement in each gear.

7.1.3 Washboard Test Track. Corrugated profile as per sinusoidal curve with a height of 3 cm and a length of 70 cm.

7.2 Acronyms, Abbreviations, and Symbols.

ADV	Analysis Development Validation
GVWR	Gross Vehicle Weight Rating
RHS	Right Hand Side
SOR	Statement of Requirements
SSTS	Sub System Technical Specifications
VCRI	Validation Cross Reference Index
VTs	Vehicle Technical Specifications

8 Coding System

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

Test to GMW16123

9 Release and Revisions

This standard was originated in October 2008. It was first approved by GM Powertrain. It was first published in July 2011.

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1	JUL 2011	Initial publication.

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