



Shift Quality Evaluation

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. Subjective evaluation of function, comfort and NVH behavior of the complete shift system in vehicle including internal, external shift mechanism and synchronizers.

1.2 Foreword. This standard was formerly known as GMI R-7-2.

1.3 Applicability. This procedure is applicable to all passenger vehicles with manual transmission, including FWD, RWD and AWD powertrains.

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 GMW16138

2.3 Additional References.

ADV, SOR, SSTS, VCRI, VTS

3 Resources

3.1 Facilities. The test facilities and equipment shall be operable and shall have a valid calibration level. Secured track to allow accelerations, stand still and reverse driving.

3.2 Equipment.

3.2.1 Thermocouple for transmission oil temperature measurement.

3.2.2 Attached tachometer and speedometer.

3.2.3 Writing materials.

3.2.4 Subjective Rating Scale (GMW14264).

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 attached evaluation datasheet (see Appendix A).

3.3.2 External shift system, built up with new parts or, in different cases, with special parts which shall be defined in detail in the datasheet.

3.3.3 The engine type and the vehicle equipment must correspond to the release.

3.4 Test Time.

Calendar time: 2 days

Test hours: 6 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. Test evaluator shall be qualified for subjectively rating the shift system quality using the subjective rating scale according to GMW14264.

4 Procedure

4.1 Preparation.

4.1.1 Shift system adjustment shall be checked and adjusted, if needed.

4.1.2 The clutch system adjustment shall be checked and if needed adjusted according to the released specifications and requirements. Hydraulic clutch actuation system shall be bled.

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4.2 Conditions.

4.2.1 Environmental Conditions. The test shall be performed on a dry surface.

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 vehicle load is not influencing the test results. In general the evaluation shall be performed with a transmission oil temperature of $\geq +60\text{ }^{\circ}\text{C}$.

4.2.2.2 If transmission oil temperature values other than in paragraph 4.2.2.1 (cold or hot condition values) are necessary for evaluation, the respective temperature shall be documented in the evaluation sheet.

4.3 Instructions.

Note: If transmission oil temperature exceeds $+130\text{ }^{\circ}\text{C}$, terminate test.

4.3.1 Performance. This subjective evaluation test shall be performed by driving the vehicle under conditions necessary for criteria evaluation listed in paragraph 7.1, unless expressly specified herein. Driving conditions to be performed shall be determined upon test engineer's discretion.

4.3.2 Subjective Rating Scale. All the criteria defined in paragraph 7.1 shall be evaluated subjectively by using the subjective rating scale according to GMW14264.

5 Data

5.1 Calculations. The test outputs are subjective evaluations (and temperatures) only.

5.2 Interpretation of Results. All the criteria defined in paragraph 7.1 shall be evaluated subjectively by using the subjective rating scale according to GMW14264.

5.3 Test Documentation. The test results shall be noted in datasheets as provided in Appendix A and 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 Comfort. Subjective opinion for force profile characteristic in relation to shift travel. The noticeable characteristic as an overall impression shall be described more in detail by using the criteria mentioned below (see paragraphs 7.1.1.1 through 7.1.1.11), which are contents of the attached evaluation sheet (see Appendix A).

Detailed shift comfort and shift force evaluation shall be performed according to GMW16138, if required (only applicable for paragraphs 7.1.1.1 and 7.1.1.2).

7.1.1.1 Shift Force. Force noticeable as an engagement resistance on effective radius of the shift lever. Evaluation in all gears under different driving conditions with different vehicle speed and engine speed. When blocking occurs (to get stuck prior to the synchronizing process), remark as footnote.

7.1.1.2 Second Load. Every force peak, following the high and significant synchronizing load peak is called second load. The main variants of second load are:

Double bumps: Significant subsequent force peaks, noticeable during gear engagement.

Clash: Significant scratching or kickback impulse after synchronizing phase during upshifts.

7.1.1.3 Shift Toughness. Noticeable friction/stickiness of the whole system in shift direction under different shifting/load conditions.

7.1.1.4 Snap in Feeling. Force profile that supports gear engagement during synchronization following a peak of resistance under drive and stand still conditions.

7.1.1.5 Elasticity. Stiffness of external shift system in shift and select direction. The elasticity feeling is mainly influenced by the characteristic of the comfort elements which means all the decoupling rubber parts of the system.

7.1.1.6 Select Force. Force noticeable on effective radius of the shift lever in select direction, starting from 3–4 Neutral to 1–2, R and 5–(6) side.

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