



External Shift Mechanism Durability Bench Test Rear Wheel Drive (RWD)

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 determination the durability for external gear shift mechanism in Rear Wheel Drive (RWD) applications.

1.2 Applicability. This test procedure applies to all rear wheel drive passenger cars and light duty trucks using semi-remote and direct mount shift systems.

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.

Subsystem Technical Specification (SSTS)

3 Resources

3.1 Facilities. This procedure can also be run by a GM approved outside supplier or test lab.

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 A programmable controller or equivalent to control the shift position and force applied to the external shift system.

3.2.2 An environmental chamber to simulate both the engine and interior compartments capable of maintaining the temperature ranges defined in Tables A1 and A2 (Appendix A). The chamber should enclose the transmission, shift linkage and control system. The chamber should be insulated to maintain operating temperature, and vented to prevent any pressure buildup.

3.2.3 A spray nozzle capable of manually or automatically dispensing a salt and mud solution to all moving parts of the shift system within the engine compartment.

3.2.4 Instrumentation.

3.2.4.1 Load cell(s) with applicable range(s) for monitoring fore/aft and lateral loads.

3.2.4.2 A two (2) channel chart recorder or equivalent.

3.2.4.3 A two (2) channel bridge amplifier or equivalent.

3.2.5 Fixturing.

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3.2.5.1 Air cylinder(s) and mounting provision(s) sized to allow full fore/aft travel and provide proper fore/aft loading at the shift knob (see 4.3.1).

3.2.5.2 Air cylinder(s) and mounting provision(s) sized to allow full lateral travel and provide proper lateral loading at the shift knob (see 4.3.1).

3.2.5.3 Fixturing to attach the above air cylinders to the shift knob in a manner allowing for relative motion of the knob and air cylinders in their respective arcs, without binding.

3.2.5.4 Appropriate mechanism(s) for preventing over travel while shifting from one gear to another so that a shift into the wrong gear cannot be made.

3.2.5.5 Micro switches as appropriate to provide feedback information to the controller on the position of the shifter assembly in the shift pattern.

3.2.5.6 Pressure switches as needed to provide feedback information to the controller when the proper loads are reached.

3.2.5.7 An appropriate manual transmission assembly and mounting provision(s).

3.2.5.8 A section of floor pan or simulated floor pan on which to mount the shifter if applicable.

3.2.6 Salt water solution and test dust mixture in the following combination by volume:

- 0.14 kg (5 oz) Coarse Air Cleaner Test Dust
- 0.14 kg (5 oz) Number 400 Grit Alumdum
- 0.07 kg (2.5 oz) Number 150 Grit Alumdum
- 0.14 kg (5 oz) Rock Salt
- 3.79 L (1 gal) Water

3.3 Test Vehicle/Test Piece.

3.3.1 A minimum of three complete sets of transmission controls must be tested, including the following:

3.3.1.1 A transmission shift control assembly with the appropriate fasteners (grommets, isolators, etc.)

3.3.1.2 Shift knob.

3.3.1.3 Shift linkage and all attachment hardware to couple it with the transmission.

3.4 Test Time.

Calendar time: 40 days

Test hours: 36 days

Coordination hours: 4 days

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Test Technician or Test Engineer.

4 Procedure

4.1 Preparation.

4.1.1 Mount the transmission on the worktable. Using the appropriate mounting hardware, fasten the shift control assembly on the table on a section of the vehicle floor pan or a simulated floor pan. Attach any other material mentioned in 3.3.1, pertinent to the shift control system to be tested, per the applicable design layout.

4.1.2 Mount the fore/aft air cylinder at a height such that the load is applied at an angle that simulates the driver's forearm angle while driving the particular vehicle for which the shift controls are being tested.

4.1.3 Mount the lateral cylinder in line with the shifter's neutral gate. This air cylinder should be mounted at the same height as the shift knob when the knob is in the center of its lateral travel.

4.1.4 Attach the load cell(s) and the air cylinders to the shift knob. Force shall be applied to the knob at the Load Application Point (LAP), reference Figure A1 (Appendix A).

4.1.5 Attach all necessary over-travel stop mechanisms, micro switches and pressure switches.

4.1.6 Attach all necessary plumbing and wiring.

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