



Shiftability of Manual Transmission, Static

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. Measuring of shift system and transmission related values (static shiftability).

1.2 Foreword. Not applicable.

1.3 Applicability. This procedure is applicable for all manual shifted vehicles with floor mounted shift actuation (not yet applicable for dashboard actuation systems or other 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.

SOR, VTS, SSTS, ADV Plan, VCRI

3 Resources

The test facilities and equipment shall be operable and shall have a valid calibration level.

3.1 Facilities.

3.1.1 Test chamber.

3.2 Equipment.

3.2.1 Measuring system device and sensors for the following measurements:

- Shift and select travel resolution ≥ 0.1 mm, sampling rate 500 Hz)
- Shift and select force (resolution ≥ 0.1 N, sampling rate 500 Hz).

3.2.2 Writing material.

3.3 Test Vehicle/Test Piece.

3.3.1 External shift system, assembled according to specification.

3.3.2 Transmission, assembled according to specification.

3.3.3 Transmission fluid as released or fluid shall be tested.

3.4 Test Time.

Calendar time: 1 day

Test hours: 1 hour

Coordination hours: 7 hours

3.5 Test Required Information. Beside paragraph 2.3 possible sources are:

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

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation.

4.1.1 Install force and travel sensors.

4.1.2 Adjust force and travel sensors and neutral position of shift lever according to Absolute Coordinate System (see example in Figure 1).

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Originating Department: GME Specification Center

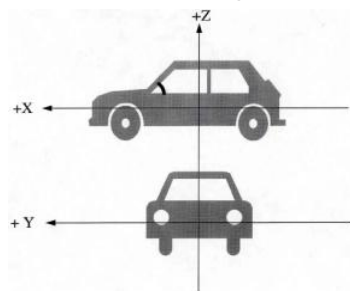
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Figure 1: Example for Adjusted Measurement System



4.1.3 Check limits of shift and select travel sensor, if necessary readjust travel sensors.

4.1.4 Prepare data sheet.

4.1.5 Activate measuring system and perform an operation check.

4.2 Conditions.

4.2.1 Environmental Conditions. The test shall be performed as an indoor test in a well conditioned chamber at $(+23 \pm 5) ^\circ\text{C}$.

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.

Note: Unless not specified herein, for value requirements necessary (e.g. shift force) refer to corresponding superior specifications, according to paragraph 3.5.

4.3.1 Neutral Position. See Figure 2.

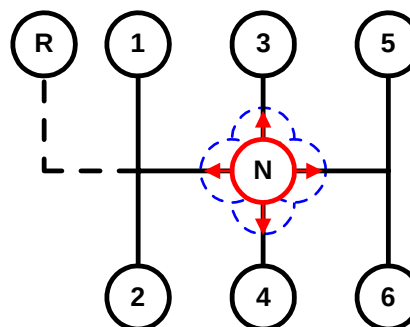
4.3.1.1 By using $\approx 5 \text{ N}$ press shift lever gently in 3rd gear direction (stay in Neutral) to eliminate lash.

4.3.1.2 Measure and save the working coordinates for this point (X, Y).

4.3.1.3 Repeat for 4th gear direction, for 1-2-select direction and for 5-6-select direction.

4.3.1.4 Measure and save the working coordinates for these points.

Figure 2: Neutral Position



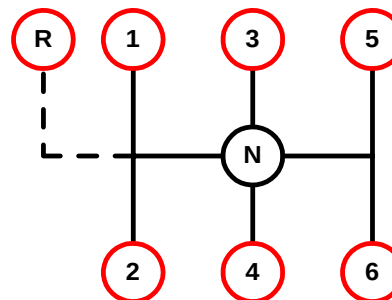
4.3.2 Engaged Gear Positions. See Figure 3.

4.3.2.1 Engage 1st gear, measure and save the working coordinates for this point.

4.3.2.2 Shift back to Neutral and re-engage 1st gear. Measure and save the coordinates again.

4.3.2.3 Repeat these steps for each gear.

Figure 3: Engaged Gear Positions



4.3.3 Shift Pattern. See Figure 4.

4.3.3.1 Start travel measurement.

4.3.3.2 Engage all gears sequentially, starting in Neutral (shift cycle: N-1-2-3-4-5-(6)-N-R-N).

4.3.3.3 Take hand off from the shift lever in each gear for short time.

4.3.3.4 Stop and save measurement.