



Steering Column Torsional Rate 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. The purpose of this test is to evaluate the on-center and off-center torsional rate (stiffness) and on-center lash (deflection) of the steering shaft. This procedure may be used for development or validation. The test profile used applies a constant torque to the steering shaft. Results of the test will report the on-center and off-center torsional rate (stiffness), in Newton-meter per degree (N·m/degree), and the on-center lash (deflection), in degrees.

1.2 Applicability. This test procedure is applicable to any steering column including electrically assisted.

1.3 Remarks. This procedure can be used to measure the input (steering wheel) of the column and measure the output (rack side) of the column.

2 References

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

2.1 External Standards/Specifications.

ISO 9001

2.2 GM Standards/Specifications.

GMW17477

2.3 Additional References.

- CG3735
- LMS, Siemens Product Lifetime Management Software Incorporated, Plano, Texas (www.plm.automation.siemens.com)
- MB Dynamics Technology, Test Processes and Engineering Services, Cleveland, Ohio (www.mbdynamics.com)

3 Resources

3.1 Facilities. A bedplate/slotted table approximately 1.2 m × 1.8 m (4.0 ft × 6.0 ft). The bedplate/slotted table must be isolated from outside influences that can affect the data collection portion of the test.

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 Driver (Load) Simulator (DS)-10. Stimulate driver input conditions to column.

3.2.2 DS-25. Stimulate road input conditions to column.

3.2.3 Mounting Fixture. Used to mount brackets and column.

3.2.4 Integrated Absolute Angular Encoder. Measures the external position of steering column.

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3.2.5 Torque Transducer. Used to measure the torque values of the DS-10 and DS-25 motors.

3.2.6 MB Dynamics Technology Application Software. Create and run test profiles for applicable tests.

3.2.7 LMS Data Acquisition. Records data for applicable tests.

3.2.8 Adjustable Flywheel. Use to modify the momentum for applicable test and simulate mass of steering wheel.

3.2.9 Column Brackets. Use to attach column to mounting fixture.

3.2.10 Shaft Lock Mechanism. Use to lock the shaft of the column rack side when applying loads to input shaft, and lock the input shaft of the column when applying loads to the column rack side.

3.3 Test Vehicle/Test Piece. This procedure applies to any steering column, including electrically assisted.

3.4 Test Time. Time shown is typical per test and per test specimen.

Calendar time: 1 day

Test hours: 1 hour

Coordination hours: 0.5 hour

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Operator must be qualified and documented as capable to run this test as required by ISO 9001.

4 Procedure

4.1 Preparation. Refer to GMW17477, section titled, Procedure.

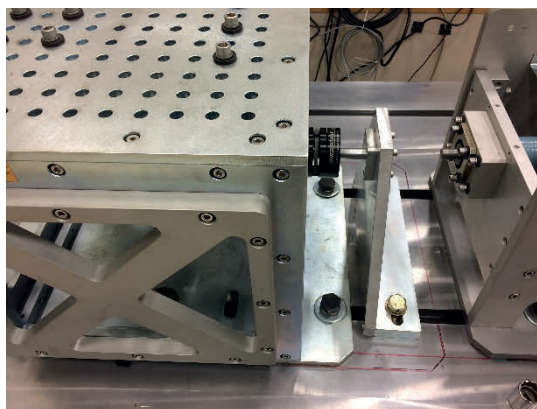
4.1.1 Installing Steering Column.

4.1.1.1 Install the column to mounting fixture using the column brackets. Refer to GMW17477, sections titled, Steering Column thru DS Motors and Installing Steering Column.

4.1.1.2 Make sure torsion spring is uninstalled and the aluminum shaft is installed. Refer to GMW17477, sections titled, Torsion Spring Installation as a guided reference.

4.1.1.3 If testing the input side of the column, lock the shaft on the rack side. If testing the rack side of the column, lock the shaft on the input side; refer to GMW17477, section titled, Torsional Stiffness Fixture Installation and Removal Process. See Figures 1 and 2 for reference.

Note: Center the column before locking it to torsional stiffness fixture.



Note: Display the torsional stiffness fixture attached to the column on the rack side (DS-25).

Figure 1: Picture of Torsional Stiffness After Set Up on the Rack Side

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