



Steering Wheel Static Torsional Strength

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 determine the permanent deformation characteristics and ultimate torsional strength of the steering wheel assembly.

1.2 Applicability. Steering wheels used in passenger cars, Multipurpose Passenger Vehicles (MPV), and trucks.

1.3 Remarks. This test actually is of a semistatic nature, with a relatively slowly increasing load.

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

3 Resources

3.1 Facilities.

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 Torsional test machine capable of measuring angular position and of applying up to (340 ± 7) N-m of torque at a rotation rate of (10 ± 1) degree/minute (see Figure A1).

3.2.2 Fixture for torsional machine to support steering wheel.

3.2.3 The fixture must enable torque to be applied to the rim of the steering wheel around the axis of the steering wheel hub.

3.2.4 The steering wheel rim is clamped at two locations 180° apart.

3.2.5 The steering wheel is bolted to a production steering column shaft that is fixtured to bed plate.

3.2.6 Provisions should be made to accommodate steering wheels of various diameters.

3.2.7 The fixture must utilize bearings which allow free axial movement.

Note: All instrumentation is to be calibrated as required; record instrumentation details and date of calibration on Data Sheet A1, unless the information is otherwise preserved in the testing laboratory records.

3.3 Test Vehicle/Test Piece. Not applicable.

3.4 Test Time.

Calendar time: 5 days

Test hours: 8 h

Coordination hours: 48 h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation. Mount the steering wheel assembly on the torsional test machine using the support fixture.

4.2 Conditions.

4.2.1 Environmental Conditions. Not applicable.

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.

4.3.1 Permanent Deformation.

4.3.1.1 With no torque applied, reference the angular position of the steering wheel and record as "initial reading" on Data Sheet A2.

4.3.1.2 Deflect the steering wheel torsionally at the rate of $(10 \pm 1)^\circ/\text{minute}$ until (135 ± 3) N·m of torque is obtained.

4.3.1.3 Stop the machine within 5 s and release the torque at a rate of $(10 \pm 1)^\circ/\text{minute}$. Within 1 minute time, measure the angular position of the steering wheel and record as "second reading" on the data sheet. Be sure the steering wheel did not slip; repeat the test if slip occurred.

4.3.1.4 Calculate and record, on Data Sheet A2, the permanent torsional deformation of the steering wheel (subtract "initial reading" from "second reading").

4.3.2 Ultimate Torsional Strength.

4.3.2.1 Deflect the steering wheel torsionally at a rate of $(10 \pm 1)^\circ/\text{minute}$ until its ultimate strength or (340 ± 7) N·m is exceeded.

4.3.2.2 Record, on Data Sheet A2, the highest torque value obtained and whether or not the ultimate strength was exceeded.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation. Record pertinent test results on the supplied data sheets.

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, company 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. Not applicable.

7.2 Acronyms, Abbreviations, and Symbols.

MPV Multipurpose Passenger Vehicles