



Constant Amplitude Durability of Suspension Stabilizer Bars

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. Service life determination of new parts and residual life determination of parts removed from experimental vehicles by a constant amplitude fatigue test.

1.2 Applicability. This specification is intended for solid or hollow stabilizer bar assemblies.

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. Stabilizer test fixture.

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 One (1) gear motor and eccentric drive having a maximum stroke of approximately 200 mm. Alternatively, a servo-hydraulic loop with the necessary instrumentation required to generate the required loading may also be used.

3.2.2 One (1) cycle counter.

3.2.3 One (1) shutoff device (actuated when a low voltage circuit is interrupted in case of stabilizer failure).

3.2.4 All axle and suspension components necessary to mount the sample.

3.2.5 One (1) torsion-gauged stabilizer.

3.2.6 One (1) test amplifier.

3.2.7 One (1) recorder to determine and record torsional strain.

3.3 Test Vehicle/Test Piece. Three (3) to six (6) stabilizers shall be tested.

3.4 Test Time. Setup time for the test is approximately 3 h. Test length will vary based on specific cycles required by the program.

Calendar time: 2 days

Test hours: 24 hours

Coordination hours: 3 hours

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3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Technician will be required for test set up and monitoring. Equipment should automatically monitor for load loss with a safety shutoff when the limit is exceeded.

4 Procedure

4.1 Preparation.

4.1.1 Mount the stabilizer in original assembly, observing the specified bolt tightening torques and pre-tightening specifications for rubber dampers (see Appendix A, Figures A1 and A2).

4.1.2 Connect the terminals of the shutoff circuit as close to the ends of the stabilizer as possible.

4.1.3 Adjust the eccentric stroke so that either the maximum torsional stress indicated on the drawing is obtained.

4.1.4 Torsional stress and the number of cycles are specified on the drawing, or per design or test engineer's direction.

4.2 Conditions. For a new design, the torsional strain level for the test is determined by running a representative data acquisition vehicle on the prescribed durability schedule and measuring the resulting strain levels. This measured data is then reduced in the laboratory to a constant strain level with the appropriate number of cycles, which will provide equivalent fatigue damage to the stabilizer bar.

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. In the fixture (tilting device) the stabilizer shall be constantly deflected (constant amplitude test). The test frequency is approximately 3 Hz.

The test shall be run until a fatigue crack occurs.

Maximum running time is three (3) times 90% nominal fatigue life.

5 Data

5.1 Calculations. The obtained "lives to fracture" shall statistically be evaluated. The stabilizer durability is indicated (logarithmic) as 99% fatigue life probability. This value shall be equal to or exceed the number of cycles specified on the drawing.

Alternatively, a Weibull analysis may be performed where the B1 life is comparable to 99% fatigue life probability.

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation. Damages to the rubber and suspension parts shall be determined and included 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, 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.

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