



Fatigue Test of Chassis Damper Spring Seats

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. Determination of chassis damper spring seat service life with regard to fatigue strength and for quality control purposes.

1.2 Applicability. For all chassis damper spring seats on wheel-carrying spring struts and coil over shock 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. Resonance pulsing device or servo-hydraulic cylinder or spring testing machine (for offset springs).

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 Resonance pulsing device or servo-hydraulic cylinder:

- Load cell.
- Force control device with closed control circuit for regulation of cycling forces.
- Force control by means of digital display.
- Load cycle preset counter.

3.2.2 Dynamic spring testing machine:

- Force controlled testing machine.
- A load cell is required for control.
- Force control by means of digital display.
- Load cycle preset counter.

3.3 Test Vehicle/Test Piece. For evaluation of the dynamic durability, a sufficient number of spring seats (at least six (6) parts) shall be tested, which enables evaluation according to the Weibull analysis.

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In the case of offset springs (strut side load compensation using **C** or **S** shaped spring; sometimes called a “side load spring”), production representative springs shall be used for testing purposes (see Figure 1). The maximum and minimum vertical forces and the lateral force shall be taken from the relevant spring drawing.

3.4 Test Time.

Calendar time: 40 Days
Test hours: 26 Days
Coordination hours: 2 Weeks

3.5 Test Required Information.

 Not applicable.

3.6 Personnel/Skills. Operators shall be experienced with using a servo-hydraulic or electro-mechanical test equipment. Operator shall be capable of using basic measurement equipment.

4 Procedure

4.1 Preparation. Example of the test setup for testing upper and lower spring seats are shown in Figure 1. (Details can be taken from the equipment drawing, or functionally equivalent device can be used.)

The spring seats shall be mounted as in the vehicle or by means of a suitable device. As in production, the lower spring seat shall be welded to a support tube section, representative of the actual production part, to allow simultaneous testing of the weld joint.

4.2 Conditions.

4.2.1 Environmental Conditions. If not otherwise specified, the test shall be performed at $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

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.

4.2.2.1 The test forces $F_{\text{Compression}}$ = Maximum spring force, and F_{Rebound} = Minimum spring force, on the upper and lower spring seats and shall be taken from the relevant spring drawing. To ensure the worst case stresses are evaluated for the spring seat, use the highest load spring to be applied.

4.3 Instructions.

4.3.1 The test force application is done using a representative coil spring and spring isolator (if applicable) (see Figure 1).

4.3.2 Run parts to failure or 750 000 cycles (Note: 250 000 cycles is assumed to be one (1) life), whichever comes first.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. The service life of the spring seats, up to the formation of one crack, shall be greater than or equal to the number of load cycles specified by drawing. A Weibull analysis shall be performed to demonstrate a component reliability of 99% or greater at a 50% confidence level (R99C50) at service life (the Reliability Evaluation Point).

5.3 Test Documentation. The measurement results shall be presented in a test report with reference to this Test Procedure.

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