



Front Wheel Drive Front Suspension/Frame Forward Braking and Acceleration Durability

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 evaluate the durability of front wheel drive and all-wheel drive front suspension and frame systems when subjected to forward braking and acceleration forces.

1.2 Applicability. This procedure applies to front wheel drive and all-wheel drive vehicles only and should not be used for engine mount testing.

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.

- CG190 Evaluation Report Writing Template
- Component Technical Specification (CTS)
- Subsystem Technical Specification (SSTS)

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 Bedplate. Bedplate area large enough to accommodate the front suspension system and/or front half of vehicle buck and fixturing to support suspension.

3.2.2 Hydraulic Actuator/Controller. One (1) servo-hydraulic actuator capable of achieving a dynamic stroke of 0.25 m (10 in) and a dynamic load greater than that calculated as the braking force in 5.1.

One (1) adequately sized load cell (per braking force, 5.1) and a controller capable of driving the actuator at a 0.7 Hz sine wave using a feedback load loop.

3.2.3 Upper Fixturing. If a vehicle buck is not used, depending on suspension configuration, fixturing may be necessary to support the upper strut mounts. This fixturing must properly locate the upper strut mounts in all three (3) axes and be capable of supporting strut loads when compressed at design height.

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3.2.4 Angle Stands. The angle stands (usually four (4)) or the equivalent capable of rigidly supporting the front suspension system and/or the front half of the vehicle buck during testing. The suspension must be held high enough above the bedplate to allow the loading arms and loading beam to operate freely underneath.

3.2.5 Loading Arms. Two (2) loading arms (one (1) for each side) that bolt to the test vehicle's wheel stud pattern and have a length equal to the vehicle's largest tire rolling radius.

3.2.6 Loading Beam. The loading beam must span the width between the loading arms. It attaches in the center to the actuator with a clevis and to the loading arms on both ends with a pin joint.

3.2.7 Modified Brakes. The test sample brakes must be modified to allow free rearward rotation without allowing forward rotation. This allows the actuator to apply a moment to the half-shafts/engine during the forward acceleration portion of the loading cycle, but also to apply a moment to the brake/steering knuckle during the forward braking portion. Figure 1 and Figure 2 schematically show the action of the loading arm and the modified brake during forward braking and acceleration, respectively.

3.2.8 Typical Test Setup. Appendix A, Figures A1 and A2, shows a typical test setup.

3.3 Test Vehicle/Test Piece. Each sample to be tested should consist of a complete front suspension system, including engine, transmission, and associated mounts.

The number of samples to be tested should be determined by the Component Technical Specification (CTS) or Subsystem Technical Specification (SSTS) reliability requirement.

3.4 Test Time.

Calendar time: 12 days to 15 days

Test time: 40 h to 50 h

Coordination time: 6 h to 8 h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills.

3.6.1 One (1) laboratory test technician skilled in the setup, tuning, and use of hydraulic test equipment and controllers.

3.6.2 One (1) test engineer for test planning, direction, and incident analysis.

3.6.3 One (1) validation engineer to help acquire material from the release engineer, plan test timing, and determine test sample size requirements and the number of lives for each sample.

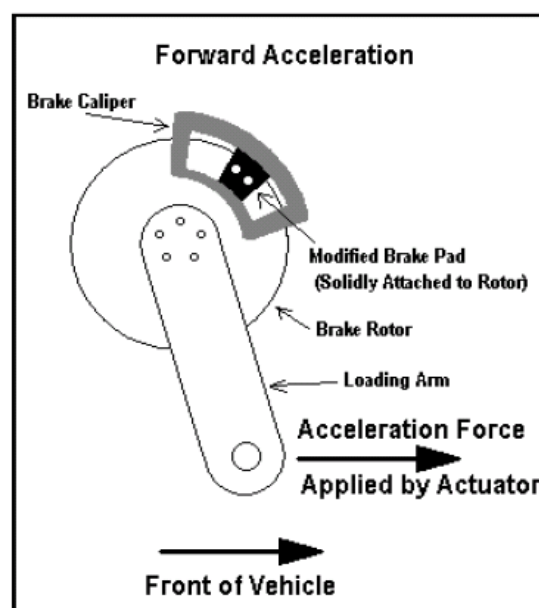


Figure 1: Action of the Loading Arm and the Modified Brake During Acceleration

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