



Park Brake Torque Reversal

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 procedure is to test for loosening of the park brake backing plate bolts and related components due to torque reversals applied to the park brake system.

1.2 Applicability. This standard is applicable for all vehicles.

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. Test should be conducted on the skid pad at Holden's Proving Ground, Lang Lang, Australia, or equivalent facility. The facility must be of sufficient size to allow the vehicle to slide sideways while stopping from 20 km/h. Test road surface must be asphalt or concrete (high peak friction coefficient).

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 Peak load indicator for park brake, hand-lever, or foot-pedal.

3.2.2 Torque wrench.

3.2.3 Additional equipment may be specified in the Laboratory Test Request.

3.2.4 All instrumentation should be listed in the test record. Include identification number and calibration date.

3.3 Test Vehicle/Test Piece. The vehicle and park brake system should be built as per production with new park brake parts. All fasteners of the park brake system should be set to the minimum torque, as specified by the vehicle manufacturer. Requesting engineer should document any variations.

3.4 Test Time.

Calendar time: 2 days to 4 days

Test hours: 6 hours to 8 hours

Coordination hours: 6 hours to 8 hours

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3.5 Test Required Information. For electrically applied park brake systems, consult the requesting engineer for any instrumentation needs and special instructions about the method to apply the park brake. Some electrically applied systems require two (2) pulls (pushes) of the switch to engage maximum apply of the park brake.

3.6 Personnel/Skills. A test engineer or technician trained to perform the tasks as specified in section 4 is required.

4 Procedure

4.1 Preparation.

4.1.1 Rebuild the park brake system as per the Laboratory Test Request.

4.1.2 Ensure mechanisms are functioning correctly. Adjust park brake mechanism and the cable system, so that park brake is adjusted for minimum park brake lever travel, while still avoiding any park brake drag.

4.1.3 All fasteners of the park brake system should be set to the minimum torque specified by the vehicle manufacturer, unless otherwise specified in the Laboratory Test. Bolts with a thread locking compound must be allowed cure time for the compound. Document the initial torque setting for all park brake fasteners in the test record.

4.1.4 Mark a straight line across bolt heads and backing plate using paint pen or other durable marker to indicate original position.

4.1.5 Load vehicle to the axle loads specified on the Laboratory Test Request. The recommended axle loads are the loads for the heaviest Gross Vehicle Weight Rating (GVWR) variant for the vehicle platform.

4.1.6 Perform a 30% hill-hold test. Document the park brake hand lever or foot pedal apply force and the lever or pedal travel (number of clicks, if applicable) required to hold the vehicle on the 30% grade facing uphill and downhill. If the vehicle will not hold a 30% grade, use 20% grade. For Electric Park Brake (EPB), simply record if the vehicle held the 30% or 20% grade.

4.2 Conditions.

4.2.1 Environmental Conditions.

4.2.1.1 Test road surface must be dry.

4.2.1.2 Ambient temperature should be documented in the test record.

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 One (1) test cycle is defined as follows:

- Accelerate to 20 km/h in the forward direction.
- Apply park brake as rapidly as possible, to a hand-lever or foot-pedal force of at least 350 N. Allow the vehicle to slide to rest. Vehicles using EPB will need to remove the fuse on the Electronic Brake Control Module (EBCM) prior to this step. This will enable a park brake apply using the rear wheels only. Insure that the apply button is activated continuously until the vehicle comes to rest.
- Release the park brake.
- Accelerate in the reverse direction to 20 km/h.
- Apply park brake as rapidly as possible to a hand-lever or foot-pedal force of at least 350 N. Allow the vehicle to slide to rest.

4.3.2 Repeat 4.3.1 for a total of 50 cycles. After every ten (10) cycles, examine the bolts for any evidence of rotation. Document the evaluations in a data table which includes number of cycles, degree of rotation, and direction of rotation (tightening or loosening).

4.3.3 If a fault in the park brake system occurs prior to completing 50 cycles, abort the test. If a tire failure occurs, replace the tire and continue.

4.3.4 At end of cycle testing, examine the bolts for any evidence of rotation. Document the evaluations in a data table which includes number of cycles, degree of rotation, and the direction of rotation (tightening or loosening).

4.3.5 Repeat 4.1.5 at the conclusion of the test.

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