



On-Hoist Residual Brake Drag Measurement

1 Scope

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. This procedure describes acceptable practice for measuring brake caliper or brake drum drag on a test vehicle supported on a hoist or other device that supports the weight of the vehicle and allows the wheels to be rotated freely.

1.2 Foreword.

1.3 Applicability and Limitations. This procedure applies to passenger cars and light trucks equipped with disc or drum brakes. It is intended for use as a quick and approximate assessment of residual drag in situations where more accurate methods are not possible or practicable, such as remote vehicle test sites, or interim measurements where full dis-assembly of the brake corner is not desirable. This procedure should not be used for benchmarking, for testing to caliper drag specifications or for characterizing brake drag contribution to road load. It is intended to identify significant issues with brake drag, typically several Newton meters (Nm) or more.

Potential sources of inaccuracy that shall be considered by the responsible test engineer include shifting of the brake rotor relative to the caliper caused by raising the vehicle on a hoist and changing the loading condition on the brake corner, difficulty in achieving repeatable bearing/driveline losses, and differing frictional/seal drag behavior as measured at very low rotational velocities.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW15316

3 Resources

3.1 Facilities. A garage that meets environmental condition requirements of 4.2.1, equipped with a vehicle hoist capable of safely lifting the test vehicle while leaving the wheels and wheel brakes on test free to rotate.

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.

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3.2 Equipment. The following equipment is needed to complete this test successfully.

- Torque meter (accurate to 0.5 Nm)
- Fixture to transmit torque from torque meter to wheel at wheel center
- Pressure transducer tapped into service brake system and readout when a brake hydraulic pressure signal is available on the vehicle's communications bus, this signal may be read and displayed as an alternate.

3.3 Test Vehicle/Test Piece. Test vehicle shall have representative wheel bearing, brake caliper, brake lining, and knuckle/caliper mounting design.

3.4 Test Time.

Calendar time: 1 day

Test hours: 2 hours

Coordination hours: 2 hours

3.5 Test Required Information.

3.6 Personnel/Skills. A technician trained to operate a vehicle hoist is required.

4 Procedure

4.1 Preparation. Hoist to lift the test vehicle, and all tools and equipment required to complete and record the intended measurements. It is critical to complete the measurements within the shortest possible window of time after performing the warm-up.

4.2 Conditions.

4.2.1 Environmental Conditions. Vehicle shall be stabilized at room temperature for at least 4 h (20 °C ± 5 °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.

4.3 Instructions.

4.3.1 Drive the vehicle 1 km at slow speed (30 km/h to 50 km/h) without any brake application warm-up.

4.3.2 Install vehicle on garage hoist and raise vehicle until wheels rotate freely.

4.3.3 Disengage the transmission (shift into neutral) and measure the total wheel brake, bearing, and driveline, drag torque over at least one (1) full rotation and record.

4.3.4 Measure the total wheel brake, bearing, and driveline - drag torque over at least one (1) full rotation and record.

4.3.5 Rotate wheel for five (5) full rotations.

4.3.6 Measure the total wheel brake, bearing, and driveline - drag torque over at least one (1) full rotation after five (5) wheel rotations and record.

4.3.7 Apply the brake pedal to 6000 kPa three (3) times in 6 s.

4.3.8 Measure the total wheel brake, bearing, and driveline - drag torque over at least one (1) full rotation and record.

4.3.9 Rotate wheel for five (5) full rotations.

4.3.10 Measure the total wheel brake, bearing, and driveline - drag torque over at least one (1) full rotation after five (5) wheel rotations and record.

4.3.11 Remove wheel and caliper (or brake drum).

4.3.12 Repeat measurements per 4.3.3 through 4.3.7 with the caliper (or drum) removed. DO NOT apply hydraulic pressure in this condition. This is a measurement of bearing and driveline residual drag. This measurement should only be completed if disassembly and reassembly of the brake corner or drum brake is acceptable to the other testing the vehicle is undergoing.

4.3.13 Reinstall caliper or brake drum, and apply hydraulic pressure to reseal the brake system.

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