



Brake System Water Recovery

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. This standard is used to determine the ability of the brake system to recover full braking torque after exposure to water.

1.2 Applicability. This test standard applies to all passenger cars and light trucks and multipurpose 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.

GMW15102

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.

3.1.3 Vehicle weighing station providing measurements of at least the front and rear axle; ballast.

3.1.4 Water trough facility with capability of a water depth of minimum 152.4 mm of sufficient length to allow a vehicle to drive forward and backward at 8 km/h.

3.1.5 A dry asphalt test road surface adjoining the water trough facility of sufficient length to allow acceleration to 48 km/h and a constant deceleration stop. The maximum distance between the water trough and the test road should be 1 km.

3.2 Equipment.

3.2.1 Thermocouples for brake linings should be used at all brake corners and for ambient temperature.

3.2.2 Brake pedal force transducer.

3.2.3 Brake pedal travel transducer.

3.2.4 Booster vacuum transducer.

3.2.5 Decelerometer.

3.2.6 Digital data acquisition system.

3.2.7 Additional instrumentation may be requested.

3.2.8 All instrumentation is to be calibrated as required. Calibration should be stored with the test record.

3.3 Test Vehicle/Test Piece.

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3.3.1 Vehicle.

3.3.1.1 Test vehicle should be representative of the vehicle family with respect to tire/wheel size, and front-to-rear mass distribution.

3.3.1.2 Brake system should have design splash shields installed.

3.3.1.3 Wheel vent area, wheel offset, and wheel size should be design intent.

3.3.2 Materials. Condition brake pads/linings and rotors/drums per test request. Burnished brake condition is recommended. A 200 stop burnish per GMW15102 is recommended.

3.4 Test Time.

Calendar time: 2 days to 3 days

Test hours: 12 hours to 14 hours (including 8 hour brake burnish)

Coordination hours: 2 hours

3.5 Test Required Information.

3.5.1 The water trough should have a water depth of minimum 152.4 mm.

3.5.2 If driving from the water trough to the test road for the recovery stops is required, minimal use of the brakes is required. If stopping is necessary, use powertrain to brake the vehicle, if possible.

3.6 Personnel/Skills. An experienced, trained brake technician is required.

4 Procedure

4.1 Preparation.

4.1.1 Document basic information about vehicle and brake system.

4.1.2 Thermocouple brake pads or linings.

4.1.3 Install brake components.

4.1.4 Install instrumentation.

4.1.5 Condition service brake pads or linings per work request.

4.1.6 Ballast the vehicle per test request. Gross Vehicle Weight Rating (GVWR) loading is recommended.

4.1.7 Adjust tire pressure to recommended level.

4.2 Conditions.

4.2.1 Environmental Conditions.

4.2.1.1 Validation testing shall be restricted to an ambient temperature range of 0 °C to 40 °C.

4.2.1.2 Wind speed should be ≤ 5 m/s. Consult test engineer if wind speed is > 5 m/s.

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 Baseline Stops.

4.3.1.1 Drive to the test road where stops after the water trough exposure will be performed.

4.3.1.2 Establish the initial brake temperature of ≥ 65 °C and ≤ 93 °C.

4.3.1.3 Accelerate to 48 km/h.

4.3.1.4 Select neutral gear.

4.3.1.5 Start data acquisition system.

4.3.1.6 Make a 0.3G constant deceleration stop, being careful not to overshoot the pedal force necessary to obtain and maintain the deceleration.

4.3.1.7 No lockup of any wheel for longer than 0.1 s at speeds greater than 15 km/h is permitted.

4.3.1.8 Repeat 4.3.1.2 thru 4.3.1.7 until a total of three (3) runs have been made.

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