



Split Coefficient Braking Yaw Response

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 objectively determine the brake induced yaw response of a vehicle and extreme Antilock Brake System (ABS) active braking conditions on surfaces offering differing levels of traction for the left and right wheel tracks.

1.2 Applicability. This procedure is applicable to passenger cars and light trucks up to 3500 kg (7716 lb) Gross Vehicle Mass (GVM) equipped with four-wheel ABS. Trucks with GVM greater than 3500 kg (7716 lb) may use this procedure, but reduced test speeds may be necessary.

1.3 Remarks. This procedure is intended to quantify the yaw response of the vehicle to braking on a split coefficient surface without steering correction.

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. None.

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 To be conducted on flat, level surfaces (less than 1% grade in any direction) with adequate length and lateral runoff to allow fixed control braking.

3.1.4 Surface friction characteristics should be known to allow comparisons between vehicles and test sites. Surfaces with differing traction characteristics must be located adjacent to each other with a clear demarcation between surfaces. The ratio of peak friction coefficients of the higher coefficient surface to the lower coefficient surface should be at least 1.5.

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

3.2 Equipment.

3.2.1 Required Equipment.

3.2.1.1 Speed Measurement Device and Readout. The speed transducer must be capable of reading velocity in excess of the vehicle test speed, a minimum of 150 km/h is recommended. The transducer accuracy must be within 0.5 km/h over the speed range of 5 km/h to 150 km/h.

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3.2.1.2 Accelerometer oriented to measure longitudinal acceleration.

The accelerometer must be capable of measuring a minimum of 1.2G, with an accuracy of 0.01G.

3.2.1.3 Angular rate sensor oriented to measure yaw velocity.

The angular rate transducer must be capable of measuring at ± 50 degrees/s with an accuracy of 0.05 degrees/s.

3.2.1.4 Steering wheel constraint or locking device.**3.2.1.5** Driver readable deceleration indicator.**3.2.1.6** Brake application indicator or pedal force transducer.**3.2.1.7** Digital data acquisition system (DAS). Scan data at a sample rate of 50 Hz.**3.2.1.8** Appropriate signal conditioning equipment and cabling.**3.2.1.9** Thermocouples to measure pad/lining temperatures.**3.2.1.10 Other Optional Equipment.** Additional instrumentation may be requested. Install additional instrumentation as directed.**3.2.2 Calibration Record.** All instrumentation is to be calibrated as required. Record instrumentation details and calibration dates.**3.3 Test Vehicle/Test Piece.** The specific vehicle chosen for testing should be representative of the vehicle population with respect to brake system, tire, suspension and mass distribution properties. Extreme cases of the preceding parameters should also be addressed.**3.4 Test Time.**

Calendar time: 2 days

Test time: 8 hours

Coordination time: 8 hours

3.5 Test Required Information. Not applicable.**3.6 Personnel/Skills.** An experienced brake/vehicle dynamics test technician is required to perform vehicle and instrumentation setup and conduct the test.**4 Procedure****4.1 Preparation.**

4.1.1 The vehicle to be tested must be in safe operating condition for maneuvering levels approaching the limit of vehicle performance. Condition of tire, brake and suspension components should be inspected carefully. All vehicle safety equipment must be in proper operating condition.

4.1.2 Vehicles with obviously high centers of gravity must be reviewed for roll stability, and maneuvers limited or safety equipment added as appropriate.

4.1.3 Information about the vehicle and the brake system should be stored with the test data.

4.1.4 Tires and tire condition shall be specified by the request engineer.

4.1.5 Brake components are to be prepared per test engineer's instructions.

Note: When this procedure is being run as part of a matrix of Combined Cornering and Braking tests, the same burnished brake hardware may be used throughout the test matrix. Also, the same tires may be used throughout the matrix as long as flat-spotting of the tires does not occur.

4.1.6 Install transducers, DAS, driver readouts and steering control equipment. Accelerometers should be mounted as near the center of gravity as possible. If the speed measurement device is vehicle mounted, attach device as close to vehicle centerline as possible.

4.1.7 Calibrate/recalibrate instrumentation as necessary.

4.1.8 Load vehicle to test configuration as specified by request engineer. Curb plus driver plus instrumentation plus full fuel load plus any required safety equipment loading is recommended. All ballast must be properly secured. Record vehicle test weight.

4.1.9 Inflate tires to manufacturer's recommended pressure or per test engineer's instructions.

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