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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Method for Stopping Distance on Paved Surfaces Using a Passenger Vehicle Equipped With Full-Scale Tires¹

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1. Scope

1.1 This test method covers the measurement of stopping distance on paved surfaces with a passenger vehicle equipped with specified full-scale automobile tires.

1.2 This test method utilizes a measurement of stopping distances representing the non-steady state skid resistance on four locked wheels as the vehicle decelerates over a wetted pavement surface under specified limits of static wheel load and from a desired speed, while the vehicle remains essentially parallel to its original direction of motion.

1.3 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

1.4 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

E 178 Practice for Dealing with Outlying Observations²

E 274 Test Method for Skid Resistance of Paved Surfaces Using a Full-Scale Tire³

E 501 Specification for Standard Rib Tire for Pavement Skid-Resistance Tests³

F 403 Test Method for Tires for Wet Traction in Straight-Ahead Braking, Using Highway Vehicles⁴

F 457 Method for Speed and Distance Calibration of a Fifth Wheel Equipped with Either Analog or Digital Instrumentation⁴

3. Summary of Test Method

3.1 The test apparatus consists of a passenger vehicle with four wheels.⁵ The apparatus contains transducers, instrumentation, and a brake system for the four test wheels. The test wheels are equipped with ASTM Pavement Test Standard Tires as specified in Specification E 501.

3.2 The pavement in the test lane is wetted. The test vehicle is brought above the desired test speed and is permitted to coast onto the wetted section until the proper speed is attained. The brakes are then promptly and forcefully applied to cause a quick lockup of the wheels and to skid to a stop. The resulting distance required to stop is recorded with the aid of suitable instrumentation, and the speed of the test vehicle at the moment of brake application is noted.

3.3 The skid resistance of the paved surface is determined from the resulting stopping distance measurement and test speed as stopping distance number, SDN, as determined from the equation given in 9.1, or as stopping distance, SD.

NOTE 1—Since speed has a significant effect on pavement surface skid resistance measurements, ranking and comparison of pavement surfaces at higher speeds might be considerably different from that at lower speeds.

4. Significance and Use

4.1 The knowledge of vehicle stopping distance serves as an additional tool in characterizing the pavement surface skid resistance. When used in conjunction with other physical and chemical tests, the skid resistance values derived from this test method may determine the suitability and adequacy of paving materials or finishing techniques. Improvements in pavement maintenance practices and schedules may result from use of this test method.

4.2 The stopping distance values measured by this test method with the equipment and procedures stated herein do not necessarily agree or correlate directly with other methods of skid-resistance measurements.^{6,7} This test method is suitable for research and development purposes, where direct comparison between pavement surfaces are to be made within the same test program.

¹ This test method is under the jurisdiction of ASTM Committee E-17 on Vehicle-Pavement Systems and is the direct responsibility of Subcommittee E17.21 on Field Methods for Measuring Tire Pavement Friction.

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² Annual Book of ASTM Standards, Vol 14.02.

³ Annual Book of ASTM Standards, Vol 04.03.

⁴ Annual Book of ASTM Standards, Vol 09.02.

⁵ Rizenbergs, R. L., and Ward, H. A., "Skid Testing With an Automobile," *Record No. 187, Highway Research Board*, 1967.

⁶ Rizenbergs, R. L., "Florida Skid Correlation Study of 1967-Skid Testing with Automobiles," *Highway Skid Resistance, ASTM STP 456*, ASTM, 1969.

⁷ Dillard, J. H., and Mahone, D. C., *Measuring Road Surface Slipperiness, ASTM STP 366*, ASTM, 1965.