



Standard Test Method for Tires for Wet Traction in Straight-Ahead Braking, Using Highway Vehicles¹

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1. Scope

1.1 This test method covers the accelerometer-based measurement of braking traction of tires designed for and mounted on cars or trucks without ABS equipped brakes traveling straight ahead on a wet or dry paved surfaces, snow, or ice.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, 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 274 Test Method for Skid Resistance of Paved Surfaces Using a Full-Scale Tire²

F 457 Test Method for Speed and Distance Calibration of a Fifth Wheel Equipped with Either Analog or Digital Instrumentation³

F 538 Terminology Relating to the Characteristics and Performance of Tires³

F 811 Practice for Accelerometer Use In Vehicles for Tire Testing³

F 1650 Practice for Evaluating Tire Traction Performance Data Under Varying Test Conditions³

3. Terminology

3.1 Definitions

3.2 *braking force, $[F]$, n* —of a tire, the negative longitudinal force resulting from braking torque application. **F 538**

3.3 *braking force coefficient, n* —of a tire, the ratio of braking force to normal force. **F 538**

3.4 *braking force coefficient, peak, n* —of a tire, the maximum value of tire braking force coefficient that occurs prior to wheel lockup as the braking torque is progressively increased. **F 538**

3.5 *braking force coefficient, slide, n* —of a tire, the value of braking force coefficient obtained on a locked wheel.

3.6 *braking torque, $[ML^2/T^2]$, n* —of a vehicle, the negative wheel torque. **F 538**

3.7 *longitudinal force, $[F]$, n* —of a tire, the component of a tire force vector in the X' direction. **F 538**

3.8 *normal force, $[F]$, n* —of a tire, the component of a tire force vector in the Z' direction. **F 538**

3.9 *test run, n* —a single pass of a loaded tire over a given test surface. **F 538**

3.10 *tire-axis system, n* —the origin of the tire-axis system is the center of the tire contact. The X' axis is the intersection of the wheel plane and the road plane with a positive direction forward. The Z' axis is perpendicular to the road plane with a positive direction downward. The Y' axis is in the road plane, its direction being chosen to make the axis system orthogonal and right-hand.

3.10.1 *Discussion*—See Fig. 1. **F 538**

3.11 *tire forces, $[F]$, n* —the external forces acting on a tire by the road. **F 538**

3.12 *torque, $[FL]$, n* —of a wheel, the external torque applied to a tire from a vehicle about the wheel spin axis. **F 538**

3.13 *vertical load, n* —the normal reaction of the tire on the road which is equal to the negative of the normal force. **F 538**

4. Summary of Test Method

4.1 The measurements are conducted on either two front tires or as an option, one front and one rear tire positioned diagonally across the vehicle. Brakes are to be applied firmly until both test tires are locked and then held locked for a period of at least 1 s at speeds ranging from 20 mph (32 km/h) to 60 mph (96 km/h). The other wheels are free rolling.

¹ This test method is under the jurisdiction of ASTM Committee F-9 on Tires and is the direct responsibility of Subcommittee F09.20 on Vehicular Testing.

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² *Annual Book of ASTM Standards*, Vol 04.03.

³ *Annual Book of ASTM Standards*, Vol 09.02.

