



Standard Test Method for Tires for Wet Driving Traction in Straight-Ahead Motion Using Highway Vehicles¹

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1. Scope

1.1 This test method covers the measurement of driving traction of tires designed for and to be mounted on cars or trucks traveling straight ahead on a prepared surface.

1.2 *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.*

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

2. Referenced Documents

2.1 ASTM Standards:

E 274 Test Method for Skid Resistance of Paved Surfaces Using a Full-Scale Tire²

E 1337 Test Method for Determining Longitudinal Peak Braking Coefficient of Paved Surfaces Using a Standard Reference Test Tire²

F 377 Practice for Calibration of Braking/Tractive Measuring Devices for Testing Tires³

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

3. Terminology

3.1 Definitions:

3.1.1 *driving coefficient (nd)*, n —the ratio of the driving force to the normal force. (F 538)

3.1.2 *driving coefficient, peak (nd)*, n —the maximum value of the driving coefficient. (F 538)

3.1.3 *driving force, [F]*, n —of a tire, the positive longitudinal force resulting from the application of driving torque.

3.1.4 *driving torque, [ML²/T²]*, n —of a wheel, the positive wheel torque. (F 538)

3.1.5 *effective rolling radius*, n —the ratio of the linear velocity of the wheel center of the free rolling tire in the X' direction to the spin velocity.

3.1.6 *free rolling tire*, n —a loaded tire rolling without applied driving or braking torque. (F 538)

3.1.7 *inclination angle*, n —of a tire, the angle between the Z' -axis and the wheel plane. (F 538)

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

3.1.9 *longitudinal slip velocity, [L/T]*, n —the effective rolling radius multiplied by the difference between the spin velocity (in rad/unit time) of a driven or braked tire and that of a free rolling tire when each is traveling in a straight line. F 538

3.1.10 *slip angle*, n —of a tire, the angle between the X' -axis and direction of travel of the center of tire contact. (F 538)

3.1.11 *spin axis*, n —of a wheel, the axis of rotation of a wheel. (F 538)

3.1.12 *spin velocity*, n —the angular velocity of the wheel about its spin axis.

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

3.1.14 *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.

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

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

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

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.