Designation: F1649 – 13

Standard Test Methods for Evaluating Wet Braking Traction Performance of Passenger Car Tires on Vehicles Equipped with Anti-Lock Braking Systems[1]

This standard is issued under the fixed designation F1649; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

These test methods cover procedures for measuring the wet braking performance of passenger car tires when tested on vehicles equipped with an anti-lock braking system (ABS). ABS operation is accomplished by the use of wheel rotation rate sensors that detect impending wheel lockup and controllable brake pressure regulators; both of these systems are connected to a control microprocessor. When potential lockup is detected for any wheel or pair of wheels, brake pressure is lowered to forestall the lockup and maintain wheel rotation. This process is repeated until the vehicle comes to a stop. The necessary lateral force to maintain vehicle control in an emergency braking situation is only possible when wheel rotation is maintained. Although there may be differences in the braking performance among the commercially available "vehicle-ABS" combinations, tires may be evaluated for their relative or comparative wet braking performance with any one "vehicle-ABS-driver" combination, by the methods as outlined in these test methods.

1. Scope

1.1 These test methods cover the measurement of two types of ABS vehicle behavior that reflect differences in tire wet traction performance when the vehicle is fitted with a series of different tire sets to be evaluated.

1.1.1 The stopping distance from some selected speed at which the brakes are applied.

1.1.2 The lack of control of the vehicle during the braking maneuver. Uncontrollability occurs when the vehicle does not follow the intended trajectory during the period of brake application despite a conscious effort on the part of a skilled driver to maintain trajectory control. Uncontrollability is measured by a series of parameters related to this deviation from the intended trajectory and the motions that the vehicle makes during the stopping maneuver.

1.1.3 Although anti-lock braking systems maintain wheel rotation and allow for a high degree of trajectory control, different sets of tires with variations in construction, tread pattern, and tread compound may influence the degree of trajectory control in addition to stopping distance. Thus vehicle uncontrollability is an important evaluation parameter for tire wet traction performance.

1.2 These test methods specify that the wet braking traction tests be conducted on two specially prepared test courses: *(1)* a straight-line (rectilinear) "split-μ" (μ = friction coefficient) test course, with two test lanes deployed along the test course (as traveled by the test vehicle); the two lanes have substantially different friction levels such that the left pair of wheels travels on one surface while the right pair of wheels travels on the other surface; and *(2)* a curved trajectory constant path radius course with uniform pavement for both wheel lanes.

1.3 As with all traction testing where vehicle uncontrollability is a likely outcome, sufficient precautions shall be taken to protect the driver, the vehicle, and the test site facilities from damage due to vehicle traction breakaway during testing.

[1] These test methods are under the jurisdiction of ASTM Committee F09 on Tires and is the direct responsibility of Subcommittee F09.20 on Vehicular Testing.

Current edition approved May 1, 2013. Published June 2013. Originally approved in 1995. Last previous edition approved in 2003 as F1649 – 96 (2003) which was withdrawn January 2012 and reinstated in May 2013. DOI: 10.1520/F1649-13.

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