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Standard Practice for Linear Tire Treadwear Data Analysis[1]

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ε[1] NOTE—Editorial corrections made throughout in June 2013.

1. Scope

1.1 This practice describes the elementary linear regression analysis of basic treadwear data as obtained according to Test Method F421 and Test Method F762.

1.2 The basic treadwear data are obtained as groove depth loss measurements by procedures described in Test Method F421 after a series of test cycles (test distances under specified conditions) according to Test Method F762.

1.3 A linear regression analysis is performed for the relationship between average tire tread depth and the test distance traveled by the test vehicle, on which the test tires are mounted. From this analysis a rate of wear is determined: groove depth loss per unit distance.

1.4 Linear treadwear is defined as an essentially constant rate of wear, after break-in, which results in a linear regression coefficient of determination, R^2, equal to or greater than 0.95 when obtained for a data set where the number of measurement intervals, n, is at least 3. Each measurement interval represents a specific test distance.

1.5 This practice is not applicable to the prediction of treadlife for tires that exhibit non-linear or irregular treadwear.

1.6 Evaluation parameters are given for both SI and inch-pound units; either may be used. The evaluation parameters as defined are ones typically used in the tire testing industry and no special claim is made for superiority of these parameters and terms over other terms and parameters that may be developed.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F421 Test Method for Measuring Groove and Void Depth in Passenger Car Tires

F538 Terminology Relating to the Characteristics and Performance of Tires

F762 Test Method for Determining Change in Groove (or Void) Depth With Distance Traveled for Passenger Car Tires

3. Terminology

3.1 *Definitions:*

3.1.1 *average tire tread depth,* [L], *n*—the average of all tire groove (void) depth measurements. **F538**

3.1.2 *break-in,* [L], *n*—one or more periods of initial standardized tire operation during which tire is brought to the state which will lead to more consistent test results. **F538**

3.1.3 *fastest wearing groove,* [L], *n*—the circumferential groove with the minimum life expectancy. **F538**

3.1.4 *fastest wearing location,* [L], *n*—that location which exhibits the highest percent tread (depth) loss as calculated in 6.1.1. **F538**

3.1.5 *groove, average depth,* [L], *n*—the average of all tire groove depth measurements in a single groove. **F538**

3.1.6 *projected treadlife,* [L], *n*—the test distance that gives h as the average tread depth; where h is the height of treadwear indicator above groove (or void) base. **F538**

3.1.7 *test distance,* [L], *n*—distance traveled by a vehicle after tire break-in. **F538**

4. Summary of Practice

4.1 This practice provides a calculation procedure for linear regression analysis of treadwear data to be used in the tire industry for assessing tire treadwear performance.

4.2 No specific mathematical formulas are given for the customary least-squares calculations used for linear regression parameter evaluation since these calculation algorithms are readily available with electronic hand calculators or statistical software for personal computers, or both. Terms are defined for slope, intercept, and coefficient of determination.

[1] This practice is under the jurisdiction of ASTM Committee F09 on Tires and is the direct responsibility of Subcommittee F09.30 on Laboratory (Non-Vehicular) Testing.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.