



Standard Practice for Tire Testing Operations—Basic Concepts and Terminology for Reference Tire Use¹

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1. Scope

1.1 This practice presents some basic concepts for tire testing and a standard set of terms relating to the use of reference tires frequently used for comprehensive tire testing programs. The tests may be conducted in a laboratory on various dynamometer wheels or other apparatus as well as at outdoor proving ground facilities. The overall objective of this practice is to develop some elementary principles for such testing and standardize the terms used in these operations. This will improve communication among those conducting these tests as well as those using the results of such testing.

1.2 In addition to the basic concepts and terminology, a statistical model for tire testing operations is also presented in Annex A1. This serves as a mathematical and conceptual foundation for the terms and other testing concepts; it will improve understanding. The annex can also serve for future consultation as this practice is expanded to address additional aspects of the testing process.

1.3 This overall topic requires a comprehensive treatment with a sequential or hierarchical development of terms with substantial background discussion. This cannot be accommodated in Terminology F 38.

1.4 *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 1136 Specification for a Radial Standard Reference Test Tire²
- F 538 Terminology Relating to the Characteristics and Performance of Tires³
- F 1082 Practice for Tires—Determining Precision for Test Method Standards³
- F 1650 Practice for Evaluating Tire Traction Performance Data Under Varying Test Conditions³

3. Significance and Use

3.1 Tire testing operations usually consist of a sequence of tests that involve special “reference” tires in addition to the candidate tires being evaluated for their performance characteristics. Reference tires serve as an “internal benchmark” which may be used to adjust for variation in test results to give improved comparisons among the candidate tires. Numerous approaches have been adopted using different terminology for such testing. This causes confusion and the purpose of this practice is to standardize some of the elementary concepts and terminology on this topic.

4. Summary of the Practice

4.1 Elementary testing concepts, terms, and definitions are developed in hierarchical or sequential order beginning with basic testing operations. Each definition may be accompanied by a specific discussion or expanded text section appropriate to general definitions. Many of the terms could be defined as adjectives; however, as recommended by ASTM policy, the word “tire” is included in each definition avoiding the complication of defining adjectives. The definitions apply equally to items or objects other than tires.

5. Basic Testing Concepts and Terms

5.1 Background on Testing:

5.1.1 Despite the adoption of standardized testing procedures, test result variation influences data generated in any type of testing. As outlined in Annex A1, there are two main categories: [1] variation inherent in the production process for a group of nominally identical objects or tires and [2] variation due to the measurement operation. Each of these two sources may be further divided into two types of variation; [1] systematic or bias variation (the variation causing one laboratory to be consistently different from another laboratory) and [2] random error variation. Both types can exist simultaneously for either of the main categories.

5.1.2 Random variation can be reduced to a low level by appropriate replication and sampling procedures, but bias variation cannot be so reduced. Bias variation can be reduced or eliminated by the appropriate use of reference objects or tires. This is the major rationale for their use in testing operations (see Annex A1).

5.1.3 Bias variation can also be reduced or eliminated by comprehensive programs to sort out causes of such perturbations and eliminate these causes.

¹ This practice is under the jurisdiction of Committee F-19 on Tires and is the direct responsibility of Subcommittee F09.94 on Terminology.

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² Annual Book of ASTM Standards, Vol 04.03.

³ Annual Book of ASTM Standards, Vol 09.02.