



Designation: D 4483 – 99

Standard Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries¹

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1. Scope

1.1 This practice presents guidelines for preparing clear, meaningful precision statements for test method standards under the jurisdiction of ASTM Committee D-11 on Rubber Testing and for ASTM Committee D-24 on Carbon Black Testing. It explains the potential uses for standard test methods and gives the requirements for interlaboratory programs needed in precision formulation, the calculation algorithms for precision, and the format for expressing precision.

1.2 Test methods are used in many ways in technology. This broad usage requires careful consideration in assessing their general precision and, where pertinent, their accuracy. Clearly outlining the objectives and the uses of test methods prior to the determination of test precision is essential. A critical requirement for this is the development of a standardized nomenclature system. This practice addresses these and other issues important in evaluating precision for test method standards.

1.3 This practice is divided into the following sections:

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Statistical Model for Precision Testing	Annex A1
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Establishing a Functional Relationship Between <i>r</i> , <i>R</i> , and <i>M</i>	Annex A4
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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:

D 1646 Test Methods for Rubber—Viscosity, Stress Relaxation, and Pre-Vulcanization Characteristics (Mooney Viscometer)²

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method³

2.2 ISO Standard:

ISO 5725 Precision of Test Methods—Determination of Repeatability and Reproducibility by Interlaboratory Tests⁴

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*—This section gives descriptions for the important terms used in this practice. However, Section 5 should be reviewed simultaneously with this section for a more complete understanding of the need for certain terms.

NOTE—The descriptions of terms are given in a logical development sequence rather than alphabetical order.

3.1.1 *accuracy, bias, precision*—to set the stage for the more specific terminology to follow, three general terms are given. Although this practice does not address the issue of accuracy or bias, these terms are presented to clearly show the difference between these two and precision.

3.1.2 *accuracy*—the degree of correspondence between an average measured value and an accepted reference or standard value for the material or phenomenon under test.

3.1.2.1 *Discussion*—The reference value may be established by theory, by reference to an *accepted* standard, to another test method, or in some cases the average that could be obtained by applying the test method to all of the sampling units comprising a lot of the material.

3.1.3 *bias*—the difference between the average measured test result and the accepted reference value.

3.1.3.1 *Discussion*—High accuracy implies a small or negligible bias and when bias exists increased testing does not increase accuracy but merely enhances the knowledge of the degree of bias.

¹ This practice is under the jurisdiction of ASTM Committee D-11 on Rubber and is the direct responsibility of Subcommittee D11.16 on Application of Statistical Methods.

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² *Annual Book of ASTM Standards*, Vol 09.01.

³ *Annual Book of ASTM Standards*, Vol 14.02.

⁴ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.