



Standard Guide for Reducing Test Variability¹

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1. Scope

1.1 This guide serves as an aid to subcommittees writing and maintaining test methods. It helps to (1) determine if it is possible to reduce test variability, and, if so, (2) provide a systematic approach to the reduction.

1.2 This guide includes the following topics:

Topic Title	Section Number
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Measures of Test Variability	5
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Identifying Probable Causes of Test Variability	7
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1.3 The annexes include:

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Statistical Test Selection	Annex A1
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Ruggedness Test Analysis:	
Unknown or Undefined Distribution—Small Sample	Annex A4
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Averaging:	
No Compositing	Annex A15
Compositing	Annex A16

2. Referenced Documents

2.1 ASTM Standards:

D 123 Terminology Relating to Textiles²

D 1907 Test Method for Yarn Number by the Skein Method²

D 2256 Test Method for Tensile Properties of Yarns by the Single-Strand Method²

D 2904 Practice for Interlaboratory Testing of a Textile Test Method that Produces Normally Distributed Data²

D 2906 Practice for Statements on Precision and Bias for Textiles²

D 3512 Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Random Tumble Pilling Tester Method³

D 3659 Test Method for Flammability of Apparel Fabrics by Semi-Restraint Method³

D 4356 Practice for Establishing Consistent Test Method Tolerances^{3,4}

D 4467 Practice for Interlaboratory Testing of a Test Method that Produces Non-Normally Distributed Data³

D 4686 Guide for Identification of Frequency Distributions³

D 4854 Guide for Estimating the Magnitude of Variability from Expected Sources in Sampling Plans³

E 456 Terminology Relating to Quality and Statistics⁴

E 1169 Guide for Conducting Ruggedness Tests⁴

2.2 ASTM Adjuncts:

TEX-PAC⁵

NOTE 1—Tex-Pac is a group of PC programs on floppy disks, available through ASTM Headquarters, 100 Barr Harbor Drive, West Conshohocken, PA 19428, USA. The analysis described in Annex A4 can be conducted using one of these programs.

3. Terminology

3.1 Definitions:

3.1.1 *average, n—for a series of observations*, the total divided by the number of observations. (Syn. *arithmetic average, arithmetic mean, mean*)

3.1.2 *block, n—in experimenting*, a group of units that is relatively homogeneous within itself, but may differ from other similar groups.

3.1.3 *degrees of freedom, n—for a set*, the number of values that can be assigned arbitrarily and still get the same value for each of one or more statistics calculated from the set of data.

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² *Annual Book of ASTM Standards*, Vol 07.01.

³ *Annual Book of ASTM Standards*, Vol 07.02.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

⁵ PC programs on floppy disks are available through ASTM. For a 3½ inch disk request PCN:12-429040-18, for a 5½ inch disk request PCN:12-429041-18.