



Designation: D 4854 – 95

Standard Guide for Estimating the Magnitude of Variability from Expected Sources in Sampling Plans¹

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1. Scope

1.1 This guide serves as an aid to subcommittees in writing specifications and sampling procedures.

1.2 The guide explains how to estimate the contributions of the variability of lot sampling units, laboratory sampling units, and specimens to the variation of the test result of a sampling plan.

1.3 The guide explains how to combine the estimates of the variability from the three sources to obtain an estimate of the variability of the sampling plan results.

1.4 The guide is applicable to all sampling plans that produce variables data (Note 1). It is not applicable to plans that produce attribute data, since such plans do not take specimens in stages, but require that specimens be taken at random from all of the individual items in the lot.

NOTE 1—This guide is applicable to all sampling plans that produce variables data regardless of the kind of frequency distribution of these data, because no estimates are made of any probabilities.

1.5 This guide includes the following topics:

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Analysis of Data Using ANOVA	Annex A1
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2. Referenced Documents

2.1 ASTM Standards:

- D 123 Terminology Relating to Textiles²
- D 2904 Practice for Interlaboratory Testing of a Textile Test Method that Produces Normally Distributed Data²
- D 4271 Practice for Writing Statements on Sampling in Test Methods for Textiles³
- D 4467 Practice for Interlaboratory Testing of a Textile Test Method that Produces Non-Normally Distributed Data³

¹ This guide is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.93 on Statistics.

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² Annual Book of ASTM Standards, Vol 07.01.

³ Annual Book of ASTM Standards, Vol 07.02.

E 456 Terminology Relating to Quality and Statistics⁴

2.2 ASTM Adjuncts:

TEX-PAC⁵

NOTE 2—Tex-Pac is a group of PC programs on floppy disks, available through ASTM Headquarters, 100 Barr Harbor Drive, Conshohocken, PA 19428, USA. The calculations described in the annexes of this guide, including the cost comparisons of various sampling plans, can be conducted using one of these programs.

3. Terminology

3.1 Definitions:

3.1.1 *analysis of variance (ANOVA)*, *n*—a procedure for dividing the total variation of a set of data into two or more parts, one of which estimates the error due to selecting and testing specimens and the other part(s) possible sources of additional variation.

3.1.2 *attribute data*, *n*—observed values or determinations which indicate the presence or absence of specific characteristics.

3.1.3 *component of variance*, *n*—a part of a total variance identified with a specific source of variability.

3.1.4 *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.

3.1.4.1 *Discussion*— For example, if only an average is specified for a set of five observations, there are four degrees of freedom since the same average can be obtained with any values substituted for four of the observations as long as the fifth value is set to give the correct total. If both the average and standard deviation have been specified, there are only three degrees of freedom left.

3.1.5 *determination value*, *n*—the numerical quantity calculated by means of the test method equation from the measurement values obtained as directed in a test method. (*Syn.* determination) (See also *observation*.)

3.1.6 *laboratory sample*, *n*—a portion of material taken to represent the lot sample, or the original material, and used in the laboratory as a source of test specimens.

3.1.7 *lot sample*, *n*—one or more shipping units taken to represent an acceptance sampling lot and used as a source of laboratory samples.

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 5¼ inch disk request PCN:12-429041-18.