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Standard Guide for Proficiency Test Program for Fabrics¹

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INTRODUCTION

Proficiency testing is the use of interlaboratory test comparisons to determine the performance of individual laboratories for specific tests and to monitor the consistency and comparability of a laboratory's test data.

Participation in proficiency testing programs provides laboratories with an objective means of assessing and demonstrating the reliability of the data they are producing. Although there are several types of proficiency testing programs, they all share the common feature of the comparison of test results obtained by two or more laboratories.

One of the main uses of proficiency testing programs is to assess laboratories' ability to perform tests competently. This will involve the preparation of the test specimens, calibrating or validating the testing equipment, performing the tests and reporting the data.

Bodies assessing the technical competence of testing laboratories normally require or expect satisfactory participation in proficiency testing as evidence of a laboratory's ability to produce reliable test results.

1. Scope

1.1 This guide outlines the Proficiency Test Program for Fabrics. Elements for planning the proficiency test program, selecting the sample fabrics to be used, the testing protocol, and the calculations for the data to be reported are included in this practice.

1.2 The planning of the proficiency test program requires a general knowledge of testing of textile fabrics and statistical principles included in the analysis of the data.

1.3 This guide is designed to meet the quality systems proficiency and competence requirements of participating laboratories. This program is not accredited to any international standard.

1.4 The instructions in this guide follow the logic of full scale laboratory tests as described in Practice D 2904 and Guide E 1301, except with this new guide placing its emphasis on proficiency testing.

1.5 Procedures given in this guide are applicable to methods based on the measurement of discrete measurement data and grades or scores.

2. Referenced Documents

2.1 ASTM Standards:

- D 123 Terminology Relating to Textiles²
- D 737 Test Method for Air Permeability of Textile Fabrics²
- D 1230 Flammability of Apparel Fabrics, 16CFR 1610²
- D 2261 Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure Constraint Rate of Extension (CRE) Tensile Testing Machine²
- D 2904 Practice for Interlaboratory Testing of Textiles that Produces Normally Distributed Data²
- D 2906 Statements on Precision and Bias for Textiles²
- D 3775 Test Method for Fabric Count of Woven Fabric²
- D 5034 Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)³
- D 5035 Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)³
- D 6545 Flammability of Textiles Used in Children's Sleepwear³

¹ This guide is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.60 on Fabric Test Methods, Specific.

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² Annual Book of ASTM Standards, Vol 07.01.

³ Annual Book of ASTM Standards, Vol 07.02.

E 1301 Guide for Proficiency Testing by Interlaboratory Comparisons⁴

3. Terminology

3.1 For definitions of textile and statistical terms used in this practice, and discussions of their use, refer to Terminology **D 123** and appropriate textbooks on statistics.

3.2 *Definitions*—The relevant definitions are from Terminology **D 123**, and are the most relevant and applicable being quoted for the purposes of this practice.

3.2.1 *accuracy, n—of a test method*, the degree of agreement between the true value of the property being tested (or accepted standard value) and the average of many observations made according to the test method, preferably by many observers. **D 2906**

3.2.2 *batch sample, n*—the material(s) used for the proficiency test study taken from a common roll or garment lot and distributed to the participants.

3.2.3 *bias, n—in statistics*, a constant or systematic error in test results.

3.2.4 *calibrate, n*—to determine and record the relationship between a set of standard units of measure and the output of an instrument or test procedure.

3.2.5 *precision, n*—the degree of agreement within a set of observations or test results obtained as directed in a method.

3.2.5.1 *Discussion*—The term “precision,” delimited in various ways, is used to describe different aspects of precision. This usage was chosen in preference to the use of “repeatability” and “reproducibility.”

3.2.6 *precision, n—under conditions of between-laboratory precision*, the multi-laboratory single sample, single operator-apparatus-day (within laboratory) precision of a method; the precision of a set of statistically independent test results all of which are obtained by testing the same sample of material and each of which is obtained in a different laboratory by one operator using one apparatus to obtain the same number of observations by testing randomly drawn specimens over the shortest practical time interval. For a more detailed definition, refer to **D 2906**.

3.2.7 *proficiency testing, n*—determination of the laboratory testing performance by means of interlaboratory comparisons.

3.2.8 *program coordinator, n*—the person(s) responsible for management of all logistical issues, data collection, and report preparation.

3.2.9 *repeatability, n—in statistics*, the distribution of several measurements on the same part by one operator with the same gage.

3.2.10 *reproducibility, n—in statistics*, the distribution of several measurements on the same part by several operators with the same gage.

3.2.11 *sample, n*—(1) a portion of material which is taken for testing or record purposes. (2) a group of specimens used, or of observations made, which provide information that can be used for making statistical inferences about the population(s) from which the specimens are drawn.

3.2.12 *specimen, n*—a specific portion of a material or a laboratory sample upon which a test is performed or which is selected for that purpose.

3.2.13 *test result, n*—a value obtained by applying a given test method, expressed as a single determination or a specified combination of a number of determinations.

3.2.14 *testing laboratory, n*—laboratory that performs tests (including calibration) (also referred to as “participating laboratory,” or just “laboratory”).

4. Significance and Use

4.1 Proficiency testing is a means of securing estimates of the variability of results obtained by different laboratories testing homogeneous materials taken from batch samples when following procedures prescribed in a specific test method.

4.1.1 For the purpose of this guide, homogeneous materials are considered to be laboratory samples cut from the same batch sample (roll or garment lot) and selected at random for the participant laboratories.

4.2 This proficiency test program is to be considered a full-scale interlaboratory test, in which a reasonably large number of laboratories participate by testing a series of materials using one or more operators per laboratory and report the data for analysis.

4.2.1 For the purposes of this guide, Full Scale Laboratory Test is defined in Practice **D 2904**. This is not to be confused with the full scale testing terminology and definitions which appear in other test methods, such as flammability, that describe the size of the specimens being tested.

4.3 The statistical data generated by this practice provide information needed to exhibit participation in a formal proficiency test study.

4.4 All data are submitted to the program coordinator at ASTM Headquarters for the preparation and distribution of the proficiency testing program reports. All laboratory data are confidential with no disclosure of lab identity except for each participant’s own laboratory. Published reports contain all laboratory test data (coded), statistical analysis of test data, charts plotting test results versus lab code, and other information.

5. Materials to be Used in Study

5.1 *Mechanical Testing Program*—Three types of materials are to be included in the study. The materials shall be described as light, medium and heavy as defined by the breaking strengths. The materials to be used for this study shall be selected by the Subcommittee D13.93 with assistance from participant laboratories and pertinent subcommittees. An accredited laboratory selected by the Subcommittee D13.93 shall act as host and maintain these materials. The host laboratory shall not be held responsible for the performance of the test materials at the participant laboratories.

5.2 *Flammability Test Program*—At least seven types of fabrics are to be available for the study, not all of which will be used at the same time. The materials shall be described by fiber type, construction type (woven, knit, nonwoven), surface characteristics and fabric weight as defined by the flammability characteristics. The fabrics to be used for this study shall be

⁴ Annual Book of ASTM Standards, Vol 14.02.