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Standard Guide for Recommended Formats for Data Records Used in Computerization of Test Data for Plastics[1]

This standard is issued under the fixed designation E 1723; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers recommended formats for the recording of test data for plastics for inclusion in computerized material property databases. The database designer should be able to construct the data dictionary preparatory to developing a database schema from this information. Not covered within the scope of this guide are guidelines for identification of the materials themselves or descriptions of the materials, or both. Those guidelines are covered in separate documents such as Guide E 1308E 1308.

1.2 The recommended format specified in this guide is suggested for use in recording data in a database, which is different from the contractual reporting of actual test results for a specific lot of material. The latter type of information is specified in materials specifications shown in business transactions and is subject to agreement between vendor and the purchaser.

1.3 This guide is specific to tension testing by Test Methods D 638 and D 638MD 638D 638M, polymer melt flow rate testing by Test Method D 1238D 1238, thermal expansion testing by Test Methods D 696 and E 228D 696E 228, deflection temperature testing by Test Method D 648D 648, and Vicat softening temperature testing by Test Method D 1525D 1525.

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 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing[2]

D 638 Test Method for Tensile Properties of Plastics[2]

D 638M Test Method for Tensile Properties of Plastics [Metric][2]

D 648 Test Method for Deflection Temperature of Plastics Under Flexural Load[2]

D 696 Test Method for Coefficient of Linear Thermal Expansion of Plastics[2]

D 883 Terminology Relating to Plastics[2]

D 1238 Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer[2]

D 1525 Test Method for Vicat Softening Temperature of Plastics[2]

E 6 Terminology Relating to Methods of Mechanical Testing[3]

E 111 Test Method for Young's Modulus, Tangent Modulus, and Chord Modulus[3]

E 228 Test Method for Linear Thermal Expansion of Solid Materials with a Vitreous Silica Delatometer[4]

E 380 Practice for Use of the International System of Units (SI)[4]

E 1013 Terminology Relating to Computerized Systems[5]

E 1308 Guide for the Identification of Polymers (Excludes Thermoset Elastomers) in Computerized Material Property Databases[5]

E 1443 Terminology Relating to Building and Accessing Material and Chemical Databases[5]

3. Terminology

3.1 *Definitions*—Computer-related technical terms in this guide are defined in Terminologies E 1443 and E 1013E 1443E 1013 and other standards referenced in those terminologies. Technical terms related to plastics are defined in Terminology D 883D 883.

4. Significance and Use

4.1 Because of the intense activity in building computerized materials databases and the desire to encourage uniformity and

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[2] *Annual Book of ASTM Standards*, Vol 08.01.

[3] *Annual Book of ASTM Standards*, Vol 03.01.

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

[5] *Annual Book of ASTM Standards*, Vol 14.01.

ease of data comparison and data interchange, these recommended formats provide for the inclusion of specific elements of test data in such databases.

4.2 This guide defines the principal data elements that are considered important and worth recording and storing permanently in computerized data storage systems from which machine-readable databases will be developed. These data elements are not intended to be requirements of any specific or single database; however, if available, they are likely to be valuable for building databases for various applications and so should be recorded and stored in the primary data storage file.

4.3 This guide has no implication on data required for materials production or purchase. Reporting of actual test results shall be as described in the actual material specification or as agreed upon between the vendor and the purchaser as shown on the purchase order and acknowledgment.

4.4 This guide is designed to encourage the builders of databases to include sufficiently complete information such that comparisons among individual sources may be made with assurance that similarities and differences in the test procedures and conditions may be determined. Comparisons of data from various sources will be most meaningful if all of the elements are available.

4.5 This guide is designed to provide sufficient detail such that every testing variable that influences a test result is recorded.

4.6 The data elements included in this guide are presented in recommended formats. These data elements provide sufficiently complete information that users may be confident of their ability to compare sets of data from individual databases and to make the database useful to a relatively broad range of users.

4.6.1 The data elements in the recommended formats are designed to be used in constructing the data dictionary preparatory to developing a database or other data storage system. The use of these data elements will facilitate comparisons among data in different databases.

4.6.2 Many databases are prepared for specific applications, and individual database builders may elect to omit certain data elements considered to be of no value for that specific application.

4.6.3 A number of data elements are considered essential to any database and need to exist in the database. These data elements shall be completed to make the record meaningful according to the pertinent guidelines or standard. Data elements are considered essential if they are required in order for the user to have sufficient information to interpret the data and in order to make a comparison of data from different sources meaningful. A comparison of data from different sources may be possible if essential information is missing, but the value of the comparison may be greatly reduced. In the recommended formats these data elements are marked with asterisks. Note that situations do arise in which essential data are not available. For example, failure strain cannot be provided if the strain-measuring devise is not functioning when the test specimen fails. The database design and the engineer recording the test data shall use their judgment for such cases.

4.6.4 These recommended formats do not represent a requirement that all of the data elements shall be included in every database. Rather, these recommended formats are guides as to those data elements that are likely to be useful to at least some users of most databases.

4.6.5 Not all of the data elements recommended for inclusion will be available for all databases; this fact should not discourage database builders and users from proceeding as long as the essential data elements are included (the items noted by the asterisks).

4.6.6 Additional data elements of value to users of a database may be available in some cases. In those cases, database builders are encouraged to include them with the data elements in the recommended formats.

4.7 The recommended data recording formats do not include the recommended material description or the presentation of other specific types of test data. This information is covered by other recommended formats, including Guide E 1308E 1308.

5. Recording of Test Data

5.1 The following types of data elements are included in the recommended format for each test method; multiple data elements may be required to cover some categories satisfactorily:

5.1.1 Test identification,
5.1.2 Specimen information,
5.1.3 Test parameters and procedures,
5.1.4 Test results and analysis, and
5.1.5 Test validation.

5.2 The linkage of a data record for one or more test results with a data record for a material is accomplished during the development of a database schema using these recommended formats and guides with recommended formats specific to the identification and description of materials.

5.2.1 A database builder has considerable flexibility in developing the database schema, and the recommended formats contained in this guide are intended to support that flexibility.

6. Recommended Formats for Standard Data Records

6.1 The recommended formats for recording test data are listed in the appendixes that follow and include four columns of information: data element number; data element descriptive name; data type; and category sets, value sets, or units as listed.

6.1.1 *Data Element Number*—A reference number for ease of dealing with the individual data elements in this guide. The data element number has no permanent value and does not become part of a database itself.

6.1.2 *Data Element Descriptive Name*—The complete and unambiguous name, descriptive of the data element and descriptive of the data element being identified in the data format.

6.1.3 *Data Type*—The kind of data to be included in the data element, such as the type of numbers, character strings, logical values, date, and time.

6.1.4 *Category Sets, Value Sets, or Units*—A listing of the types of information that would be included in the data element or, in the case of properties or other numeric data elements, the units in which numbers are expressed.