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## Standard Guide for Identification of Fibers, Fillers, and Core Materials in Computerized Material Property Databases<sup>1</sup>

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### 1. Scope

1.1 This guide establishes the essential and desirable elements of data required for the identification in computerized material property databases of fibers, fillers, and core materials used in composite materials. A recommended format for entry of these fields into a computerized database is provided. Examples of the application of this guide are also included.

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

1.3 The materials covered by this guide include fibers, both continuous and discontinuous, and fillers of various geometries which are used as reinforcements in composite materials, as well as core materials used in sandwich composites. Cores may be foam, honeycomb, or naturally occurring materials such as balsa wood. These materials are distinguished from bulk materials by the importance of their specialized geometric forms to their properties. This difference is reflected in the use of geometry, along with chemistry, as a primary basis for classification. Identification of composite materials is discussed in Guide E 1309.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- C 274 Terminology of Structural Sandwich Constructions<sup>2</sup>
- D 123 Terminology Relating to Textiles<sup>3</sup>
- D 883 Terminology Relating to Plastics<sup>4</sup>
- D 3878 Terminology of High Modulus Reinforcing Fibers and Their Composites<sup>2</sup>
- E 1309 Guide for the Identification of Composite Materials in Computerized Material Property Databases<sup>2</sup>
- E 1443 Terminology Relating to Building and Accessing

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<sup>2</sup> Annual Book of ASTM Standards, Vol 15.03.

<sup>3</sup> Annual Book of ASTM Standards, Vol 07.01.

<sup>4</sup> Annual Book of ASTM Standards, Vol 08.01.

Material and Chemical Databases<sup>5</sup>

### 3. Terminology

3.1 *Definitions*—Terminology D 3878 shall be used where applicable.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *core, n*—a generally, centrally located layer or composite component of a sandwich construction, usually low density, which separates and stabilizes the facings and transmits shear between them and provides most of the shear rigidity of the construction (see Terminology C 274).

3.2.2 *essential field, n*—a field in a record which must be filled to meet the requirements of a stated type of database (see Terminology E 1443).

3.2.2.1 *Discussion*—Fields are considered essential if they are required to make a meaningful comparison of property data from different sources. A comparison of data from different sources may still be possible if essential information is omitted, but the value of the comparison may be greatly reduced.

3.2.3 *fiber, n*—in textiles, the general term for a filamentary material having a length at least ten times its nominal diameter.

3.2.4 *field, n*—an elementary unit of a record that may contain a data item, a data aggregate, a pointer, or a link (see E 1443).

3.2.5 *field name, n*—a name or code associated with a field and used for identification (see Terminology E 1443).

3.2.6 *filler, n*—a relatively inert material added to a plastic to modify its strength, permanence, working properties, or other qualities, or to lower cost (see Terminology D 883).

3.2.7 *strand, n*—in textile fibers, a normally untwisted bundle of filaments.

3.2.8 *value set, n*—an open listing of representative, acceptable strings which could be included in a particular field of a record (see Terminology E 1443).

### 4. Significance and Use

4.1 This guide defines the information which is considered essential to uniquely describe a fiber, filler, or core material in a computerized database. A format is recommended for placing these data in fields suitable for a computerized database. Additional fields which are considered desirable, but not

<sup>5</sup> Annual Book of ASTM Standards, Vol 14.01.

essential, are also defined. The purpose is to facilitate efficient storage and retrieval of the information with a computer and to allow meaningful comparison of data from different sources.

4.2 Comparison of property data from different sources will be most meaningful if all the essential information defined by the guidelines is present. Comparison may still be possible if essential information is omitted, but the value of the comparison may be greatly reduced.

4.3 While at this time there is no generally accepted numbering system for these materials, analogous to those for metals and alloys, a field for an identifying number (Material Reference Number) is included should such a system be developed in the future.

4.4 This information should not be considered restrictive. For example, a database designer may find it useful to aggregate several fields, such as the material and chemical class fields, into a single field. This may affect search strategies and other database operations. These considerations are beyond the scope of this guide.

## 5. Guidelines

5.1 The following fields are recommended for identification of fibers, fillers, and core materials used in composites. For certain fields, lists of recommended entries are included. Where possible, entries should be chosen from these lists. However, these lists should not be regarded as exhaustive.

### 5.2 Primary Identifiers:

5.2.1 *Material Reference Number*—Identifying number or code, if any, for the particular material.

5.2.2 *Class*—Classification by form, either fiber, filler, or core.

5.2.3 *Subclass*—Further subdivision by geometric form within the class. See Table 1 for list.

5.2.4 *Chemical Family*—Classification of the material by its generic chemical composition family. See Table 1 for list.

### 5.3 Commercial Specification:

5.3.1 *Common Name*—Name by which the material is known in the industry.

5.3.2 *Additional Name Information*—Additional information on the name, such as chemical composition details on the material.

5.3.3 *Specification Organization*—A company, industry, government, national, regional, or international organization issuing the specification; for example, ASTM.

5.3.4 *Specification Number*—The specification number within the organization referenced.

5.3.5 *Specification Version*—The year or revision code of the specification.

5.3.6 *Specification Designation*—The designation used for the material in the specification.

### 5.4 Characteristics:

5.4.1 *Density*.

5.4.2 *Cross-Section Type*—Geometry of cross section of the material. See Table 2 for list.

5.4.3 *Dimension Parameter*—Name of dimension characteristic of the material; for example, diameter. Dimension parameter, units, and value should be given for each characteristic dimension. See Table 3 for list.

5.4.4 *Dimension Value*—Mean or nominal numerical value of the specified dimension in appropriate units.

5.4.5 *Dimension Distribution Parameter Type*—Name of the parameter used to characterize the distribution of values for the specified dimension. See Table 4 for list.

5.4.6 *Dimension Distribution Parameter Value*—Numerical value of the distribution parameter for the specified dimension. Units are assumed to be the same as those of the dimension itself.

5.4.7 *Dimension Distribution Sample Size*—The number of samples from which the dimension distribution parameter value is determined.

### 5.5 Source:

5.5.1 *Manufacturer*.

5.5.2 *Manufacturer's Identification*—Code, part number, or other identification used by the manufacturer to identify this material.

5.5.3 *Lot Number*—Manufacturer's reference for traceability of this lot of material.

5.5.4 *Date of Manufacture*—YYYYMMDD.

### 5.6 Process Descriptors:

5.6.1 *Process Conditions*—Conditions under which the material was produced. (This refers to production of the primary form of the material; for example, fiber. If a secondary form such as fabric or braid is actually tested, its processing should be described according to Guide E 1309.)

5.6.2 *Surface Treatment Type*—Type of process used to modify the surface chemistry. See Table 5 for list.

**TABLE 1 Class, Subclass, Chemical Family, and Forms for Fibers, Fillers, and Core Materials**

NOTE 1—These are lists. The table is not intended to be read horizontally.

Class	Subclass	Chemical Family	Form
Fiber	continuous	aramid	tow or end or impregnated tow strand
	discontinuous, long	glass	plied yarn
	discontinuous, short	silicon carbide	yarn roving
	staple	aluminum oxide	mat
	milled	aluminum	other (specify)
	whisker	boron	
	pulp	other (specify)	
Filler	other (specify)		
	particulate	calcium carbonate	powder
	platelet	kaolin clay	slurry
	hollow sphere	titanium dioxide	other (specify)
	hollow cylinder	mica	
	other (specify)	talc	
Core	other (specify)	other (specify)	
	honeycomb	glass reinforced	block
	foam	aluminum	other (specify)
	other (specify)	aramid reinforced	
		polyvinyl chloride	
		balsa wood	
		polyurethane	
	polymethacrylimide		
	other (specify)		

**TABLE 2 Cross-Section Types for Fibers, Fillers, and Core Materials**

Circular
Rectangular
Oval
Irregular
Other (specify)