Designation: E 1434 – 00

Standard Guide for Recording Mechanical Test Data of Fiber-Reinforced Composite Materials in Databases[1]

This standard is issued under the fixed designation E 1434; 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 provides a common format for mechanical test data for composite materials for two purposes: (*1*) to establish data reporting requirements for test methods and (*2*) to provide information for the design of material property databases. This guide should be used in combination with Guide E 1309 which provides similar information to identify the composite material tested.

1.2 These guidelines are specific to mechanical tests of high-modulus fiber-reinforced composite materials. Types of tests considered in this guide include tension, compression, shear, flexure, open/filled hole,[2] bearing, fracture toughness, and fatigue. The ASTM standards for which this guide was developed are listed in 2.1. The guidelines may also be useful for additional tests or materials.

1.3 This guide is the second part of a modular approach for which the first part is Guide E 1309. Guide E 1309 serves to identify the material, and this guide serves to describe mechanical testing procedures and variables and to record results. The interaction of this guide with Guide E 1309 is emphasized by the common numbering of data elements. Data Elements A1 through G13 are included in Guide E 1309 and numbering data elements in this guide begins with H1.

1.4 This guide with Guide E 1309 may be referenced by the data-reporting section of a test method to provide common data-reporting requirements for the types of tests listed in 1.2.

1.5 From this information and Guide E 1309, the database designer should be able to construct the data dictionary preparatory to developing a database schema.

1.6 Data elements in this guide are relevant to test data, data as obtained in the test laboratory and historically recorded in lab notebooks. Property data, data which have been analyzed and reviewed, require a different level of data elements. Data elements for property data are provided in Annex A1.

2. Referenced Documents

2.1 *ASTM Standards:*

D 790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials[3]

D 2344 Test Method for Apparent Interlaminar Shear Strength of Parallel Fiber Composites by Short-Beam Method[4]

D 3039/D 3039M Test Method for Tensile Properties of Polymer Matrix Composite Materials[4]

D 3410/D 3410M Test Method for Compressive Properties of Polymer Matrix Composite Materials with Unsupported Gage Section by Shear Loading[4]

D 3479/D 3479M Test Method for Tension-Tension Fatigue of Polymer Matrix Composite Materials[4]

D 3518/D 3518M Practice for In-Plane Shear Stress-Strain Response of Unidirectional Polymer Matrix Composite Materials by Tensile Test of a ±45° Laminate[4]

D 3552/D 3552M Test Method for Tensile Properties of Fiber-Reinforced Metal Matrix Composites[4]

D 3878 Terminology of Composite Materials[4]

D 4255/D 4255M Guide for Testing In-Plane Shear Properties of Composite Laminates[4]

D 5229/D 5229M Test Method for Moisture Absorption Properties and Equilibrium Conditioning of Polymer Matrix Composite Materials[4]

D 5379/D 5379M Test Method for Shear Properties of Composite Materials by the V-Notched Beam Method[4]

D 5448/D 5448M Test Method for In-Plane Shear Properties of Hoop Wound Polymer Matrix Composite Cylinders[4]

D 5449/D 5449M Test Method for Transverse Compressive Properties of Hoop Wound Polymer Matrix Composite Cylinders[4]

D 5450/D 5450M Test Method for Transverse Tensile Properties of Hoop Wound Polymer Matrix Composite Cylinders[4]

[1] This guide is under the jurisdiction of ASTM Committee D30 on Composite Materials and is the direct responsibility of Subcommittee D30.01 on Editorial and Resource Standards.

Current edition approved March 10, 2000. Published May 2000. Originally published as E 1434 – 91. Last previous edition E 1434 – 99.

[2] Documentation requirements for filled-hole tests were based on open-hole tests with the addition of fastener identification and application information.

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

[4] *Annual Book of ASTM Standards*, Vol 15.03.

D 5467 Test Method for Compressive Properties of Unidirectional Polymer Matrix Composites Using a Sandwich Beam[4]

D 5528 Test Method for Mode I Interlaminar Fracture Toughness of Unidirectional Fiber-Reinforced Polymer Matrix Composites[4]

D 5766/D 5766M Test Method for Open Hole Tensile Strength of Polymer Matrix Composite Laminates[4]

D 5961/D 5961M Test Method for Bearing Response of Polymer Matrix Composite Laminates[4]

D 6115 Test Method for Mode I Fatigue Delamination Growth Onset of Unidirectional Fiber-Reinforced Polymer Matrix Composites[4]

E 6 Terminology Relating to Methods of Mechanical Testing[5]

E 111 Test Method for Young's Modulus, Tangent Modulus, and Chord Modulus[5]

E 1309 Guide for the Identification of Fiber-Reinforced Polymer-Matrix Composite Materials in Databases[4]

E 1471 Guide for the Identification of Fibers, Fillers, and Core Materials in Computerized Material Property Databases[4]

E 1013 Terminology Relating to Computerized Systems[6]

E 1443 Terminology Relating to Building and Accessing Material and Chemical Databases[6]

E 1484 Guide for Formatting and Use of Material and Chemical Property Data and Database Quality Indicators[6]

IEEE/ASTM SI 10 Standard for Use of the International System of Units (SI): The Modern Metric System[7]

2.2 *Other Standards:*

ANSI X3.172–1996 Information Technology—American National Standard Dictionary of Information Technology (ANSDIT)

CODATA A Glossary of Terms Relating to Data, Data Capture, Data Manipulation, and Databases, *CODATA Bulletin*, Vol 23, Nos. 1–2, Jan.-June 1991[8]

ISO 8601 Data Elements and Interchange Formats—Information Interchange—Representation of Dates and Times[8]

Recommended Method SRM 11R-94 SACMA Recommended Method for Environmental Conditioning of Composite Test Laminates[9]

Recommended Method SRM 1–88 SACMA Recommended Method for Compressive Properties of Oriented Fiber-Resin Composites[9]

3. Terminology

3.1 *Definitions*—Terminology in accordance with Terminologies D 3878 and E 1443 shall be used where applicable.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *composite material*—a substance consisting of two or more materials, insoluble in one another, which are combined to form a useful engineering material possessing certain properties not possessed by the constituents.

3.2.1.1 *Discussion*—A composite material is inherently inhomogeneous on a microscopic scale but can often be assumed to be homogeneous on a macroscopic scale for certain engineering applications. The constituents of a composite retain their identities; they do not dissolve or otherwise merge completely into each other, although they act in concert.

3.2.2 *data dictionary*—a collection of the names of all data items used in a software system together with relevant properties of those items; for example, length of data item, mode of representation, and so forth. **(CODATA)**

3.2.3 *data element*—one individual piece of information used in describing a material or to record test results, for example, a variable name, test parameter, and so forth.

3.2.4 *database schema*—in a conceptual schema language, the definition of the representation forms and structure of a database for the possible collection of all sentences that are in the conceptual schema and in the information base, including manipulation aspects of these forms. **(ANSI X3.172)**

3.2.5 *essential data element*—a data element in a record that must be completed to make the record meaningful in accordance with the pertinent guidelines or standard. **(E 1443)**

3.2.5.1 *Discussion*—Data elements are considered essential if they are required to make a comparison of property data from different sources meaningful. 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.

3.2.6 *value set*—an open listing of representative acceptable strings that could be included in a particular field of a record. **(E 1443)**

3.2.6.1 *Discussion*—A closed listing of such strings is called a domain or category set.

3.3 Other relevant terminology can be found in Terminologies E 6 and E 1013.

4. Significance and Use

4.1 This guide provides recommended standard formats for the computerization of mechanical test data for a range of test methods for high-modulus fiber-reinforced composite materials. The types of mechanical tests considered are tension, compression, shear, flexure, open/filled hole, bearing, fracture toughness, and fatigue. The ASTM standards for which this guide was developed are listed in 2.1. The recommended formats are not limited in use to these test methods. There are other test methods for which these recommended formats may be useful.

4.2 Comparison of data from various sources will be most meaningful if all of the elements are available.

4.3 The intent is to provide sufficient detail that values are known for the testing variables that may influence the results. The motivation for this guide is the steadily increasing use of computerized databases. However, this guide is equally appropriate for data stored in a hard-copy form.

4.4 This format is for mechanical test data for high-modulus fiber-reinforced composites only. It does not include the recommended material description or the presentation of other specific types of test data (such as fracture toughness test

[5] *Annual Book of ASTM Standards*, Vol 03.01.
[6] *Annual Book of ASTM Standards*, Vol 14.01.
[7] *Annual Book of ASTM Standards*, Vol 14.04.
[8] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.
[9] Suppliers of Advanced Composite Materials, 1600 Wilson Blvd., Suite 901, Arlington, VA 22209.

results). These items are covered by separate formats to be referenced in material specifications or other test standards.

5. Data Reporting

5.1 This guide is intended to provide common data-reporting requirements for the documents listed in 1.2. Each document will reference this guide and identify any usage specific to that document in the data-reporting section. For example, Test Method D 3410 requires that the transition strain be reported as the progressive damage parameter. These requirements do not mean that the information must be reported separately for each specimen. Any data elements that are the same for a series of specimens may be reported once for the entire series, as long as it is clearly indicated that they apply to all specimens.

5.2 The levels of requirement defined in Section 8 and identified in Table 1 apply to the data reporting for the appropriate test type: tension, compression, shear, flexure, open/filled hole, bearing, fracture toughness, and fatigue. The cost of acquiring and storing the data documentation is recognized. Less extensive data reporting requirements may be established for a given program or purpose upon agreement of the parties involved.

5.3 In some cases, a data element may be considered essential or required depending on the value in another data element. For example, if Data Element H13, the method of calculating modulus, is "Tangent," then Data Element H15, the initial strain for the modulus calculation is required (ET). In this case, Data element H16, the final strain for the modulus calculation, is not required. This dependence is shown in Table 2 by placing the number of the triggering data element, in parentheses, in the requirement level column of the dependent element. The dependent data elements are required for database design.

5.4 In addition, for data reporting, some data elements are essential only if measured. For example, strain-to-failure in a tension test can be reported only if an extensometer or strain gage was used. If strain-to-failure was measured, it should be reported.

5.5 The information that is considered essential may not always be available. For example, strain-to-failure cannot be obtained if the strain instrumentation is removed before failure. Footnote data elements, Data Elements H34 and K64, are provided to document this type of situation. Not all of the data elements included in the recommended format are appropriate for all tests, For example, there is a wide range of information applicable to the shear test methods, cited in 2.1.1, which is not appropriate for tension or compression tests.

5.6 While some test methods require the reporting of mean, standard deviation, and coefficient of variation, often the results for individual specimens are needed. This format provides for both types of data reports. Data Element Blocks F through J can be used to describe the test results for an individual specimen. Data Element Block K can be used to describe the results for an ensemble of specimens.

6. Database Design

6.1 This guide defines the principal elements of information that are considered worth recording and storing permanently in computerized data storage systems from which machine-readable databases will be developed. These are not intended to be requirements of any specific database, but if available, are likely to be valuable to engineers or material specialists building databases for various applications.

6.2 It is recognized that many databases are prepared for specific applications, and individual database builders may elect to omit certain pieces of information considered to be of no value for that specific application. However, there are a certain minimum number of data elements considered essential to any database, without which the user will not have sufficient information to interpret the data reasonably. In the recommended standard format, these data elements are indicated by levels of requirement of ET or EM as defined in Section 8. Data elements that are considered essential depending on the value of another data element are generally considered essential for database design.

6.3 The presentation of this format does not represent a requirement that all of the elements of information included in the recommendation must be included in every database. Rather it is a guide as to those elements of information recommended for inclusion in all databases; that fact should not discourage database builders and users from proceeding so long as the minimum basic information is included (based on the level or requirement). Compared to the formats for recording test data for metals, there are many more data elements, and more data elements are identified as essential. This relatively large number of data elements is due to the complexity of the materials and the test methods. These data elements represent information that may influence the results of the test or identify potential problem areas when considering a material for a specific application. These requirements do not mean that separate records for individual specimens must include all data elements. A database specific to a project or to common practice within an organization may be structured so that values for data elements that are the same for a group of specimens need only be entered once, as long as it is clearly indicated that they apply to all specimens in the group.

6.4 It is not uncommon for one or more elements of essential information to be unavailable, as noted in 5.3. It may be appropriate for databases to differentiate between zero values and null entries in data elements that are not used for a given test. Also, it is recognized that in some individual cases, additional elements of information of value to users of a database may be available. In those cases, database builders are encouraged to include them as well as the elements in the recommended format.

6.5 Depending on the database application, a database designer may wish to include individual specimen results or the statistical parameters summarizing a group of results, or both. Individual specimen results are described using the data elements in Data Blocks Q, S, T, U. The statistical parameters are described using the data elements in Data Block V. Both approaches used the data elements in Data Blocks K-P and R. This format is intended to be flexible enough that the database designer has the latitude to define the approach for a database for a specific purpose.

TABLE 1 Data Elements for Mechanical Test Data of Fiber-Reinforced Composite Materials

NOTE 1—ET = Essential for Test validation,
EM = Essential for Material traceability,
RT = Recommended for Test validity,
RM = Recommended for Material traceability, and
O = Optional.

No.	Data Element Name of Description	Data Type or Standard Data Element Set	Tension	Compression	Shear	Flexure	Open/Filled Hole	Bearing	Fracture Toughness	Fatigue	Value Sets or Units
					H. Test Method Block						
H1	Test property class	STRING					— O —				Table 2
H2	Test method	[Test_Method]					— ET —				
H3	Test personnel	[Person]					— ET —				
H4	Test facility	[Organization]					— ET —				
H5	Test facility address	[Address]					— ET —				
H6	Type of test	STRING					— RT —				Table 3
H7	Property form type	STRING					— O —				Table 4
					I. Specimen Preparation Block						
					Specimen Preparation Subblock						
I1	Specimen orientation	REAL	ET	ET	ET	ET	ET	ET	ET	ET	degrees
I2	Specimen labeling scheme	STRING	ET	ET	ET	ET	ET	ET	ET	ET	
I3	Specimen extraction technique	STRING	ET	ET	ET	ET	ET	ET	ET	ET	Table 5
I4	Coupon layout cutting plan reference	STRING	RM	RM	RM	RM	RM	RM	RM	RM	
I5	Specimen labeling method	STRING	RM	RM	RM	RM	RM	RM	RM	RM	
I6	Material sampling method	STRING	EM	EM	EM	EM	EM	EM	EM	EM	Table 6
I7	Ply count	INTEGER	RM	RM	RM	RM	RM	RM	RM	RM	
I8	Specimen geometry	STRING	RT	RT	RT	RT	RT	RT	RT	RT	Table 7
I9	Nominal specimen thickness	REAL	RT	RT	RT	RT	RT	RT	RT	RT	mm (in.)
I10	Nominal specimen width	REAL	RT	RT	RT	RT	RT	RT	RT	RT	mm (in.)
I11	Nominal specimen overall length	REAL	RT	RT	RT	RT	RT	RT	RT	RT	mm (in.)
I12	Nominal specimen gage length	REAL	RT	RT	RT	RT	-	-	-	RT	mm (in.)
I13	Nominal specimen outer diameter	REAL	ET	ET	ET	.	.	.	.	.	mm (in.)
I14	Nominal specimen inner diameter	REAL	ET	ET	ET	.	.	.	.	.	mm (in.)
I15	Nominal wall thickness	REAL	ET	ET	ET	.	.	.	.	.	mm (in.)
I16	Nominal specimen cross-sectional area	REAL	RT	RT	RT	RT	.	.	.	.	mm^2 ($in.^2$)
I17	Nominal specimen notch radius (V-notch shear)	REAL	-	-	ET	-	-	-	-	-	mm (in.)
I18	Nominal specimen notch angle (V-notch shear)	REAL	-	-	ET	-	-	-	-	-	degrees
I19	Nominal specimen gage section width (V-notch shear)	REAL	-	-	ET	-	-	-	-	-	mm (in.)
I20	Nominal hole diameter	REAL	-	-	-	-	ET	ET	-	-	mm (in.)
I21	Nominal width to diameter ratio	REAL	-	-	-	-	ET	-	-	-	
I22	Nominal thickness to diameter ratio	REAL	-	-	-	-	ET	ET	-	-	
I23	Nominal edge distance ratio	REAL	-	-	-	-	-	ET	-	-	
I24	Nominal pitch distance ratio	REAL	-	-	-	-	-	ET	-	-	
I25	Nominal bypass ratio	REAL	-	-	-	-	-	ET	-	-	
I26	Sandwich core common name	STRING	-	ET	-	-	-	-	-	-	Table 8
I27	Sandwich core type	STRING	-	ET	-	-	-	-	-	-	
I28	Sandwich core material	STRING	-	ET	-	-	-	-	-	-	
I29	Sandwich core manufacturer	STRING	-	ET	-	-	-	-	-	-	
I30	Sandwich core lot number	STRING	-	RT	-	-	-	-	-	-	
I31	Sandwich core cell size	REAL	-	ET	-	-	-	-	-	-	mm (in.)
I32	Sandwich core nominal density	REAL	-	ET	-	-	-	-	-	-	g/cm^3
I33	Sandwich core ribbon thickness	REAL	-	RT	-	-	-	-	-	-	mm (in.)
I34	Adhesive common name	STRING	-	ET	-	-	-	-	-	-	
I35	Adhesive chemical family	STRING	-	ET	-	-	-	-	-	-	
I36	Adhesive manufacturer	STRING	-	ET	-	-	-	-	-	-	
I37	Adhesive lot number	STRING	-	RT	-	-	-	-	-	-	
I38	Adhesive date of manufacture	STRING	-	RT	-	-	-	-	-	-	
I39	Adhesive scrim common name	STRING	-	RT	-	-	-	-	-	-	
I40	Adhesive scrim fabric style	STRING	-	RT	-	-	-	-	-	-	
I41	Adhesive scrim sizing	STRING	-	RT	-	-	-	-	-	-	
I42	Adhesive surface preparation	STRING	-	RT	-	-	-	-	-	-	
					NDE Subblock						
I43	NDE technique	STRING					— RM —				Table 9
I44	NDE material form	STRING					— RM —				Table 10
I45	NDE results	STRING					— RM —				Table 11
I46	NDE criteria reference	STRING					— RM —				
I47	NDE report	STRING					— RM —				
					Tab/Hinge/Loading-Block Subblock						

TABLE 1 *Continued*

No.	Data Element Name of Description	Data Type or Standard Data Element Set	Tension	Compression	Shear	Flexure	Open/Filled Hole	Bearing	Fracture Toughness	Fatigue	Value Sets or Units
I48	Tab/hinge/loading-block material	STRING	ET	ET	ET	-	RT	ET	ET	ET	
I49	Tab/hinge/loading-block adhesive	STRING	ET	ET	ET	-	RT	ET	ET	ET	
I50	Nominal tab orientation	REAL	ET	ET	ET	-	RT	ET	-	ET	degrees
I51	Nominal tab thickness	REAL	ET	ET	ET	-	RT	ET	-	ET	mm (in.)
I52	Nominal tab bevel angle	REAL	ET	ET	ET	-	RT	ET	-	ET	degrees
I53	Nominal tab length	REAL	RT	RT	RT	-	RT	RT	-	RT	mm (in.)
I54	Tab adhesive curing temperature	REAL	RT	RT	RT	-	RT	RT	-	RT	C (F)
I55	Tab adhesive curing time	REAL	RT	RT	RT	-	RT	RT	-	RT	min
	J. Specimen Conditioning Block										
J1	Specimen conditioning method	[Test_Method]					— ET —				
J2	(Number of conditioning steps)	INTEGER					— ET —				
J3	Conditioning temperature	REAL					— ET —				C (F)
J4	Conditioning parameter	STRING					— ET —				
J5	Conditioning parameter value	REAL					— ET —				
J6	Conditioning time	REAL					— ET —				h
J7	Conditioning environment	STRING					— ET —				Table 12
J8	Traveler geometry	STRING					— ET —				
J9	Equilibrium condition	STRING					— ET —				Table 13
	K. Test Equipment Block Test Machine Subblock										
K1	Type of fixture (grips)	STRING	ET	ET	ET	ET	ET	ET	ET	ET	Table 14
K2	Test machine identification	[Test_Equipment]	RT	RT	RT	RT	RT	RT	RT	RT	
K3	Actuator type	STRING	RT	RT	RT	RT	RT	RT	RT	RT	Table 15
K4	Fixture identification	STRING	RT	RT	RT	RT	RT	RT	RT	RT	
K5	Grip length	REAL	RT	RT	RT	-	RT	RT	RT	RT	mm (in.)
K6	Wedge angle	REAL	RT	RT	RT	-	RT	RT	RT	RT	degrees
K7	Gripping surface	STRING	RT	RT	RT	-	RT	RT	RT	RT	Table 16
K8	Potting material identification	STRING	ET	ET	ET	-	-	-	-	-	
K9	Radius of potting material bead	REAL	ET	ET	ET	-	-	-	-	-	mm (in.)
K10	Potting material cure temperature	REAL	ET	ET	ET	-	-	-	-	-	C (F)
K11	Span-to-depth ratio	REAL	-	-	ET	ET	-	-	-	-	
K12	Load-span to support-span ratio, nominal	STRING	-	-	-	ET	-	-	-	-	
K13	Radius of supports	REAL	-	-	-	ET	-	-	-	-	mm (in.)
K14	Radius of loading noses	REAL	-	-	-	ET	-	-	-	-	mm (in.)
K15	Equipment description	STRING	RT	RT	RT	RT	RT	RT	RT	RT	
K16	Test machine calibration	[Calibration]	RT	RT	RT	RT	RT	RT	RT	RT	
K17	Fastener or pin type	STRING	-	-	-	-	ET	ET	-	-	
K18	Fastener or pin material	STRING	-	-	-	-	ET	ET	-	-	
K19	Fastener or pin diameter	REAL	-	-	-	-	ET	ET	-	-	mm (in.)
K20	Pin hardness	STRING	-	-	-	-	-	RT	-	-	
K21	Pin surface roughness	REAL	-	-	-	-	-	RT	-	-	
K22	Hole clearance	REAL	-	-	-	-	ET	ET	-	-	mm (in.)
K23	Countersink angle	REAL	-	-	-	-	ET	ET	-	-	degrees
K24	Countersink depth	REAL	-	-	-	-	ET	ET	-	-	mm (in.)
K25	Grommet	STRING	-	-	-	-	-	ET	-	-	
K26	Mating material identification	STRING	-	-	-	-	-	ET	-	-	
K27	Mating material width	REAL	-	-	-	-	-	ET	-	-	mm (in.)
K28	Mating material thickness	REAL	-	-	-	-	-	ET	-	-	mm (in.)
K29	Mating material lay-up	STRING	-	-	-	-	-	ET	-	-	
K30	Number of fasteners	INTEGER	-	-	-	-	-	ET	-	-	
K31	Fastener or pin and coupon cleaning method	STRING	-	-	-	-	-	ET	-	-	
	L. Transducer Block										
L1	Transducer type	STRING	ET	ET	ET	-	-	ET	-	ET	Table 17
L2	Transducer location on specimen	STRING	ET	ET	ET	-	-	ET	-	ET	Table 18
L3	Extensometer class	STRING	ET	ET	ET	-	-	RT	-	ET	
L4	Transducer manufacturer	STRING	RT	RT	RT	-	-	RT	-	RT	
L5	Transducer model number	STRING	RT	RT	RT	-	-	RT	-	RT	
L6	Timing of transducer application	STRING	O	O	O	-	-	RT	-	0	
L7	Transducer cure temperature	REAL	RT	RT	RT	-	-	RT	-	RT	C (F)
L8	Transducer cure time	REAL	RT	RT	RT	-	-	RT	-	RT	min
L9	Transducer calibration	[Calibration]	RT	RT	RT	-	-	RT	-	RT	
L10	Transducer lead-wire resistance correction	REAL	RT	RT	RT	-	-	RT	-	RT	
L11	Measured extensometer gage length	REAL	RT	RT	RT	-	-	RT	-	RT	mm (in.)
	M. Specimen Geometry Block										
M1	Number of specimens	INTEGER	ET	ET	ET	ET	ET	ET	ET	ET	
M2	Specimen label	STRING	ET	ET	ET	ET	ET	ET	ET	ET	
M3	Coupons meets test method requirements?	LOGICAL	ET	ET	ET	ET	ET	ET	ET	ET	

TABLE 1 *Continued*

No.	Data Element Name of Description	Data Type or Standard Data Element Set	Tension	Compression	Shear	Flexure	Open/Filled Hole	Bearing	Fracture Toughness	Fatigue	Value Sets or Units
M4	Measured specimen thickness	REAL	ET	ET	ET	ET	ET	ET	ET	ET	mm (in.)
M5	Maximum thickness variation	REAL	-	-	-	-	-	-	ET	ET	mm (in.)
M6	Measured specimen width	REAL	ET	ET	ET	ET	ET	ET	ET	ET	mm (in.)
M7	Measured specimen reinforcement volume	REAL	O	O	-	-	O	-	-	-	vol%
M8	Measured specimen overall length	REAL	RT	RT	RT	RT	RT	ET	-	RT	mm (in.)
M9	Measured specimen gage (span) length	REAL	ET	RT	RT	RT	-	-	-	ET	mm (in.)
M10	Measured specimen outer diameter	REAL	ET	ET	ET	-	-	-	-	-	mm (in.)
M11	Measured specimen inner diameter	REAL	ET	ET	ET	-	-	-	-	-	mm (in.)
M12	Measured wall thickness	REAL	ET	ET	ET	-	-	-	-	-	mm (in.)
M13	Specimen minimum cross-sectional area	REAL	-	RT	RT	RT	-	-	-	RT	mm^2 ($in.^2$)
M14	Method of finding minimum cross-sectional area	STRING	-	RT	RT	RT	-	-	-	RT	Table 19
M15	Specimen notch radius (V-notch shear)	REAL	-	-	O	-	-	-	-	-	mm (in.)
M16	Specimen notch angle (V-notch shear)	REAL	-	-	O	-	-	-	-	-	degrees
M17	Specimen gage section width (V-notch shear)	REAL	-	-	O	-	-	-	-	-	mm (in.)
M18	Measured sandwich thickness	REAL	-	ET	-	-	-	-	-	-	mm (in.)
M19	Measured core thickness	REAL	-	ET	-	-	-	-	-	-	mm (in.)
M20	Measured opposite facesheet thickness	REAL	-	ET	-	-	-	-	-	-	mm (in.)
M21	Specimen hole diameter	REAL	-	-	-	-	ET	ET	-	-	mm (in.)
M22	Specimen width to diameter ratio	REAL	-	-	-	-	ET	-	-	-	
M23	Specimen thickness to diameter ratio	REAL	-	-	-	-	ET	ET	-	-	
M24	Specimen edge distance ratio	REAL	-	-	-	-	-	ET	-	-	
M25	Specimen pitch distance ratio	REAL	-	-	-	-	-	ET	-	-	
M26	Measured fastener or pin diameter	REAL	-	-	-	-	-	ET	-	-	mm (in.)
M27	Insert type	STRING	-	-	-	-	-	-	ET	ET	
M28	Insert thickness	REAL	-	-	-	-	-	-	ET	ET	mm (in.)
M29	Initial delamination length	REAL	-	-	-	-	-	-	-	ET	mm (in.)
	N. Test Environment Block										
N1	Date of test	DATE					— ET —				
N2	Test environment	STRING					— ET —				Table 20
N3	Test temperature	REAL					— ET —				C (F)
N4	Test humidity	REAL					— ET —				%
N5	Temperature of testing laboratory	REAL					— RT—				C (F)
N6	Relative humidity of testing laboratory	REAL					— RT—				%
N7	Soak time at test conditions	REAL					— RT —				min
N8	Moisture content before test	REAL					— RT —				%
N9	Moisture content after test	REAL					— RT —				%
N10	Nominal moisture state	STRING					— O —				Table 21
	O. Loading Block										
O1	Procedure for displacement/strain application	REAL	ET	ET	ET	ET	ET	ET	ET	ET	Table 22
O2	Rate of displacement/strain application	REAL	ET	ET	ET	ET	ET	ET	ET	-	
O3	Fixture torque-up	REAL	-	ET	-	-	-	-	-	-	(in.-lb)
O4	Jaw pressure	REAL	RT	RT	RT	-	RT	RT	RT	RT	N (lb)
O5	Preload	REAL	RT	RT	RT	RT	RT	RT	-	-	N (lb)
O6	Data acquisition method	STRING	RT	RT	RT	RT	RT	RT	RT	RT	Table 23
O7	Data acquisition sampling rate	REAL	RT	RT	RT	RT	RT	RT	RT	RT	
O8	Fastener torque	REAL	-	-	-	-	ET	ET	-	-	(in.-lb)
O9	Fatigue test control parameter	STRING	-	-	-	-	-	-	-	ET	Table 24
O10	Fatigue frequency	REAL	-	-	-	-	-	-	-	ET	
O11	Fatigue waveform	STRING	-	-	-	-	-	-	-	ET	Table 25
O12	Loading parameter ratio	REAL	-	-	-	-	-	-	-	ET	
O13	Mean load	REAL	-	-	-	-	-	-	-	ET	N (lb)
O14	Mean stress	REAL	-	-	-	-	-	-	-	ET	MPa (ksi)
O15	Mean strain	REAL	-	-	-	-	-	-	-	ET	με
O16	Average number of fatigue transition loading	REAL	-	-	-	-	-	-	-	ET	
O17	Loading procedure	STRING	-	-	-	-	-	-	-	ET	
O18	Strength of control specimens—average	REAL	-	-	-	-	-	-	-	ET	MPa (ksi)
O19	Strength of control specimens—standard deviation	REAL	-	-	-	-	-	-	-	ET	MPa (ksi)
O20	Strength of control specimens—coefficient of variation	REAL	-	-	-	-	-	-	-	ET	%
O21	Strain-to-failure of control specimens—average	REAL	-	-	-	-	-	-	-	ET	με
O22	Strain-to-failure of control specimens—standard deviation	REAL	-	-	-	-	-	-	-	ET	με
O23	Strain-to-failure of control specimens—coefficient of variation	REAL	-	-	-	-	-	-	-	ET	%
O24	Maximum cyclic displacement	REAL	-	-	-	-	-	-	-	ET	mm (in.)