Designation: G118 – 02 (Reapproved 2015)

Standard Guide for Recommended Format of Wear Test Data Suitable for Databases[1]

This standard is issued under the fixed designation G118; 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 and is intended to assist in the organization of wear test data for the purpose of data storage in computerized databases. It is meant to assist the user in developing databases for the purpose of data comparison and utilization. Data elements (fields) are described covering both materials and wear test issues.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

E1314 Practice for Structuring Terminological Records Relating to Computerized Test Reporting and Materials Designation Formats (Withdrawn 2000)[3]

E1338 Guide for Identification of Metals and Alloys in Computerized Material Property Databases

G40 Terminology Relating to Wear and Erosion

G65 Test Method for Measuring Abrasion Using the Dry Sand/Rubber Wheel Apparatus

G75 Test Method for Determination of Slurry Abrasivity (Miller Number) and Slurry Abrasion Response of Materials (SAR Number)

G77 Test Method for Ranking Resistance of Materials to Sliding Wear Using Block-on-Ring Wear Test

G83 Test Method for Wear Testing with a Crossed-Cylinder Apparatus (Withdrawn 2005)[3]

G99 Test Method for Wear Testing with a Pin-on-Disk Apparatus

G105 Test Method for Conducting Wet Sand/Rubber Wheel Abrasion Tests

G115 Guide for Measuring and Reporting Friction Coefficients

G132 Test Method for Pin Abrasion Testing

2.2 *ANSI Standard:*

B46.1.85 Surface Texture, Surface Roughness, Waviness[4]

3. Terminology

3.1 *Definitions*—For definitions of some terms applicable to this guide, see Practice E1314 and Terminology G40.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *class*—major material class, for example, metal, ceramic, polymer, etc.

3.2.2 *common name*—name frequently given to a particular material, for example, nylon.

3.2.3 *contact environment*—terms describing the environment at the contact, for example, atmosphere, humidity, gases present, and so forth.

3.2.4 *form*—material form, for example, rod, sheet, and cast.

3.2.5 *grade*—designation given a material by a manufacturer.

3.2.6 *hardness*—usual methods for hardness determinations include Rockwell C, Vickers, etc. Load should be specified.

3.2.7 *processing treatment*—descriptive phrase on the process method, for example, casting, hardening, and conditions, for example, time, temperature.

3.2.8 *specification*—precise statement of a set of requirements to be satisfied by a material, promulgated by an organization, for example, ASTM, SAE, etc.

3.2.9 *specimen shape*—shape of the test specimen, for example, block, pin.

3.2.10 *standard test specification*—test designation, that is, ASTM, SAE, etc. (Note that the test must conform to the standard if so designated.)

3.2.11 *subclass*—subdivisions of a class, for example, ferrous, boride, etc.

[1] This guide is under the jurisdiction of ASTM Committee G02 on Wear and Erosion and is the direct responsibility of Subcommittee G02.20 on Data Acquisition in Tribosystems.

Current edition approved May 1, 2015. Published May 2015. Originally approved in 1993. Last previous edition approved in 2007 as G118–02 (2007). DOI: 10.1520/G0118-02R15.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

4. Summary of Guide

4.1 This guide specifies a set of fields that form the basis of a format for organizing wear data for use in computerized databases. Sufficient information is provided in this guide to enable the user to construct a database structure suitable for an intended application involving wear. A set of essential fields in the database are identified. The user may also add or delete fields to customize the database format for any particular application.

5. Significance and Use

5.1 This guide can be used to facilitate categorizing wear data for insertion into a computerized database. This guide identifies a set of essential data fields which should be provided for all records, and also identifies additional optional data fields. This guide does not require the use of any particular database format, nor does it endorse any particular computer database software.

5.2 Because of increased activity in building computerized databases and the desire to encourage their uniformity and therefore the ease of data comparison and data interchange, it is appropriate to provide a guide for the inclusion of wear test data in databases. Availability of a guide also encourages the builders of databases to include sufficiently complete information so that comparisons among individual sources may be made with assurance that similarities or differences, or both, in the wear test procedures and conditions are covered.

5.3 The set of data fields described in this guide will usually be expanded and customized by the user for specific purposes. It should be possible to arrange the additional fields within the logical structure that is presented in this guide.

5.4 This guide does not apply to data from rolling contact wear tests, galling tests, or erosion or cavitation tests. Data that are included should apply to standard tests or to steady-state wear.

5.5 This guide has no implication on data required for materials production or purchase. Reporting of actual test results should be as described in the actual material specification or as agreed upon between the purchaser and the manufacturer, as shown on the purchase order and acknowledgement.

6. Data Categorization

6.1 Seven general categories of data are identified for use with wear databases, as follows:

6.1.1 *Test Identification*—Coded information that describes the test, for example, test number.

6.1.2 *Test Type*—Identification of the type of sliding wear test, for example, standardized (examples include Test Methods G77, G83, and G99).

6.1.3 *Test Conditions*—Description of the exposure conditions, for example, test load.

6.1.4 *Material Definition*—Information on the material pairs used in the test, for example, common names (background information is provided in Practice E527 and Guide E1338).

6.1.5 *Specimen Identification*—Detailed information on the test specimens, for example, size, surface texture (ANSI B46.1.85).

6.1.6 *Test Results*—Listing of the numeric results of the test, for example, amount of wear, friction coefficient (see Guide G115 for details of friction measurements).

6.1.7 *Documentation*—Identification of the location and type of documentation concerning the test data, for example, place of publication.

7. Data Format

7.1 A recommended format for wear test data is shown in Table 1. An example of the use of this format is shown in Appendix X1. There are three columns of information for each item, that is, each field name, as follows:

7.1.1 *Field Reference Number*—A number for each individual field within this format guideline. This number has no permanent value and does not become part of the database itself. The number is keyed to the set of categories presented in Section 6 of this guide.

7.1.2 *Field Name or Description*—The complete name of the field, descriptive of the information to be entered in this field of the database.

7.1.3 *Field Type*—There are three types of fields as described in the following:

7.1.3.1 *Category Sets*—Closed (complete) sets containing all possible (acceptable) inputs to the field.

7.1.3.2 *Alphanumeric*—Representative inputs to the field.

7.1.3.3 *Numeric*—The numeric value in the units listed.

7.2 The fields included in this format are those recommended to provide sufficiently complete information that users may be confident of their ability to compare sets of data from individual databases. This set of fields should make the database useful to a relatively broad range of users.

7.3 It is recognized that many databases are prepared for very 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 certain minimum number of fields considered essential to any database without which the user will not have sufficient information to reasonably interpret or compare the data. In the recommended format (Table 1), these fields are marked.

7.4 The presentation of this format does not represent a requirement that all of the elements included in the recommendation be appropriate for every database. Rather it is a guide to those elements that are likely to be useful to at least some users of most databases. It is understood that not all of the elements of information recommended for inclusion will be available in all databases. That fact should not discourage database builders and users from proceeding so long as the minimum essential information is included (the items marked). Blank fields are acceptable where the required information is not available.

8. Keywords

8.1 computer; data; database; format; wear

TABLE 1 Recommended Data Format for Sliding Wear Data

Field Number[A]	Field Name or Description	Field Type or Unit[B]
	Test Identification	
1.1[C]	Individual test number	alphanumeric
1.2[C]	Date of test	date
1.3[C]	Testing organization	alphanumeric
	Test Type	
2.1	Standard Test Specification	alphanumeric
2.2[C]	Laboratory or Field test	(1) laboratory (2) field
2.3[C]	Nature of sliding test	(1) non-lubricated (2) lubricated
2.4[C]	Test machine description[D]	alphanumeric
	Test Conditions	
3.1[C]	Load conditions	(1) steady (2) variable
3.2[C]	Load value	N
3.3	Pressure (nominal)	Pa
3.4[C]	Velocity conditions	(1) steady (2) variable
3.5[C]	Velocity value or range	m/s
3.6[C]	Total sliding distance	m
3.7	Sliding distance per cycle	m
3.8[C]	Test temperature	°C
3.9[C]	Ambient temperature	°C
3.10[C]	Type of motion	alphanumeric
3.11[C]	Continuity of motion	alphanumeric
3.12[C]	Contact environment description[E]	alphanumeric
3.13	Lubricated contact description[F]	alphanumeric
3.14	Abrasive contact description[G]	alphanumeric
3.15	Contact geometry[H]	alphanumeric
3.16	Other test information	alphanumeric
	Material Definitions (Specimen Pairs, A and B)	
4.1[C]	Material class, A	alphanumeric
4.2[C]	Material subclass, A	alphanumeric
4.3[C]	Common name, A	alphanumeric
4.4[C]	Grade designation, A	alphanumeric
4.5	Specification, A	alphanumeric
4.6	Form, A	alphanumeric
4.7	Processing treatment, A	alphanumeric
	Material Definitions (Specimen Pairs, A and B)—Cont.	
4.8	Composition: name, wt/vol %, A	alphanumeric
4.9	Additional description	alphanumeric
4.10	Hardness, A	number, scale
4.11	Density, A	kg/m^3
4.12[C]	Material class, B	alphanumeric
4.13[C]	Material subclass, B	alphanumeric
4.14[C]	Common name, B	alphanumeric
4.15[C]	Grade designation, B	alphanumeric
4.16	Specification, B	alphanumeric
4.17	Form, B	alphanumeric
4.18	Processing treatment, B	alphanumeric
4.19	Composition: name, wt/vol %, B	alphanumeric
4.20	Additional description	alphanumeric
4.21	Hardness, B	number, scale
4.22	Density, B	kg/m^3
	Specimen Identifications (Specimen Pairs, A and B)	
5.1[C]	Specimen number or code, A	alphanumeric
5.2[C]	Specimen shape, A	alphanumeric
5.3[C]	Specimen dimensions, A	alphanumeric
5.4	Specimen surface texture, A	alphanumeric
5.5[C]	Specimen number or code, B	alphanumeric
5.6[C]	Specimen shape, B	alphanumeric
5.7[C]	Specimen dimensions, B	alphanumeric
5.8	Specimen surface texture, B	alphanumeric
5.9	Specimen cleaning method	alphanumeric
5.10	Specimen surface production method	alphanumeric
	Test Results	
6.1[C]	Wear volume loss, A	mm^3
6.2	Wear mass loss, A	g
6.3	Other wear measure, A	alphanumeric
6.4[C]	Wear volume loss, B	mm^3
6.5	Wear mass loss, B	g
6.6	Other wear measure, B	alphanumeric
6.7	Static friction coefficient	no units
6.8	Kinetic friction coefficient	no units
6.9	Comments on test	alphanumeric

TABLE 1 *Continued*

Field Number[A]	Field Name or Description	Field Type or Unit[B]
	Documentation	
7.1	Type of reference	(1) published (2) unpublished (3) technical committee report (4) other
7.2[C]	Location of reference (citation)	alphanumeric

[A] Field numbers are for reference only. They do not imply a necessity to include all these fields in any specific database.
[B] If numeric, estimated values or ranges of values may be put in parenthetically if the actual values are not known.
[C] Denotes essential information for database construction.
[D] A thorough description of the test machine is important for valid comparisons of data from different machines. For examples of the information desired in such descriptions, see Test Methods G77, G83, G99. Reference to published descriptions of the test machine is additionally desirable.
[E] A complete description of the contact environment is essential, for example, humidity level, gases present, and so forth.
[F] Indicate the type and describe the fluid present; describe any chemical additives present; for example: base oil: mineral, 110 cSt at 100°C viscosity; additives: VI improver, detergent, dispersant.
[G] Indicate the type of abrasive, grit size, or range, fixed or loose, bonding material, abrasive flow rate, fluids present, and so forth: for example: water slurry with 25 volume % AFS test sand, size –50/+70 sieve size. (See Test Methods G65, G75, G105, G132 for details of abrasive tests). [Note—Wear debris is not to be described in this field.]
[H] Indicate the shape/size: for example: hemispherical 0.5 mm radius pin *vs* flat, unless as specified in a standard test.

APPENDIXES

(Nonmandatory Information)

X1. EXAMPLE OF USE OF GUIDE FOR DATA FROM A CROSSED-CYLINDER WEAR TEST (TEST METHOD G83)

X1.1 Table X1.1 presents this information in tabular form.

TABLE X1.1 Example of Use of Guide for Data from a Crossed-Cylinder Wear Test

Field Number	Field Name	Value/Entry
	Test Identification	
1.1	Individual test number	RCC1092 1
1.2	Date of test	10-30-92
1.3	Testing organization	COMPANY, unit
	Test Type	
2.1	Standard Test Specification	Test Method G83
2.2	Laboratory or Field test	laboratory
2.3	Nature of sliding test	non-lubricated
2.4	Test machine description	NAME crossed-cyl in accordance with Test Method G83
	Test Conditions	
3.1	Load conditions	steady
3.2	Load value	36.4N
3.3	Pressure (nominal)	
3.4	Velocity conditions	steady
3.5	Velocity value or range	0.066 m/s
3.6	Total sliding distance	399 m
3.7	Sliding distance per cycle	
3.8	Test temperature	24° C
3.9	Ambient temperature	24° C
3.10	Type of motion	rotating
3.11	Continuity of motion	steady
3.12	Contact environment description	laboratory air, 41 % RH
3.13	Other test information	solid lubricant coating
	Material Definitions (Specimen Pairs, A and B)	
4.1	Material class, A	polymer
4.2	Material subclass, A	unfilled
4.3	Common name, A	PTFE
4.4	Grade designation, A	
4.5	Specification, A	
4.6	Form, A	coating, 0.5 mm thick
4.7	Processing treatment, A	applied to 440C steel rod
4.8	Composition: name, wt/vol %, A	
4.9	Additional description	
4.10	Hardness, A	
4.11	Density, A	
4.12	Material class, B	metal
4.13	Material subclass, B	ferrous

TABLE X1.1 *Continued*

Field Number	Field Name	Value/Entry
4.14	Common name, B	steel
4.15	Grade designation, B	440C
4.16	Specification, B	
4.17	Form, B	rod
4.18	Processing treatment, B	
4.19	Composition: name, wt/vol %, B	
4.20	Additional description	
4.21	Hardness, B	
4.22	Density, B	
	Specimen Identifications (Specimen Pairs, A and B)	
5.1	Specimen number or code, A	No. 1
5.2	Specimen shape, A	coated rod
5.3	Specimen dimensions, A	0.5-in. diameter by 4 in. long
5.4	Specimen surface texture, A	
5.5	Specimen number or code, B	No. 2
5.6	Specimen shape, B	rod
5.7	Specimen dimensions, B	0.5-in. diameter by 4 in. long
5.8	Specimen surface texture, B	
5.9	Specimen cleaning method	hexane, acetone, methanol
5.10	Specimen surface production method	
	Test Results	
6.1	Wear volume loss, A	0.0219 mm^3
6.2	Wear mass loss, A	
6.3	Other wear measure, A	
6.4	Wear volume loss, B	0.706 mm^3
6.5	Wear mass loss, B	
6.6	Other wear measure, B	
	Documentation	
7.1	Type of reference	unpublished
7.2	Location of reference (citation)	COMPANY (name, unit)

X2. EXAMPLE OF USE OF GUIDE FOR DATA FROM A DRY SAND/RUBBER WHEEL WEAR TEST (TEST METHOD G65)

X2.1 Table X2.1 presents this information in tabular form.

TABLE X2.1 Example of Use of Guide for Data from a Dry Sand/Rubber Wheel Wear Test (Test Method G65)

Field Number	Field Name	Value/Entry
	Test Identification	
1.1	Individual test number	DS1280B
1.2	Date of test	12-01-80
1.3	Testing organization	COMPANY, unit
	Test Type	
2.1	Standard test specification	Test Method G65 Procedure A
2.2	Laboratory or field test	laboratory
2.3	Nature of sliding test	abrasive
2.4	Test machine description	NAME
	Test Conditions	
3.1	Load conditions	steady
3.2	Load value	30 N
3.4	Velocity conditions	steady
3.5	Velocity value or range	200 RPM
3.6	Total sliding distance	4309 m
3.8	Test temperature	24°C
3.9	Ambient temperature	24°C
3.10	Type of motion	rotating, sliding
3.11	Continuity of motion	steady
3.12	Contact environment description	laboratory air, 41 % RH
3.13	Abrasion contact description	AFS 50/70 test sand, 300 g/min flow
3.14	Other test information	welded nozzle, dried sand
	Material Definitions (Specimen Pairs, A and B)	
4.1	Material class, A	polymer
4.2	Material subclass, A	elastomer
4.3	Common name, A	polybutyl rubber
4.6	Form, A	thick rim on steel wheel
4.7	Processing treatment, A	according to Test Method G65
4.10	Hardness, A	Durometer A-60
4.12	Material class, B	metal
4.13	Material subclass, B	ferrous
4.14	Common name, B	tool steel
4.15	Grade designation, B	D-2

TABLE X2.1 *Continued*

Field Number	Field Name	Value/Entry
4.17	Form, B	bar
4.18	Processing treatment, B	harden 1010°C, temper 1 h at 205°C
4.21	Hardness, B	59 HRC
	Specimen Identifications (Specimen Pairs, A and B)	
5.1	Specimen number or code, A	W 1466
5.2	Specimen shape, A	rubber coated steel wheel
5.3	Specimen dimensions, A	9 in. diameter overall by 0.5 in. wide (includes 0.5 in. thick rubber coating)
5.5	Specimen number or code, B	No. 2
5.6	Specimen shape, B	flat
5.7	Specimen dimensions, B	0.5 in. thick by 1 in. by 3 in.
5.9	Specimen cleaning method	hexane, acetone, methanol
5.10	Specimen surface production method	A: turned; B: ground 200 grit
	Test Results	
6.4	Wear volume loss, B	39 mm^3
	Documentation	
7.1	Type of reference	unpublished
7.2	Location of reference	COMPANY (name, unit)