



Standard Guide for Format of Computerized Exchange of Soil and Rock Test Data¹

This standard is issued under the fixed designation D 6453; 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 data formats for the exchange of mechanical test data for soils and rocks. From this guide, a standardized file of data can be prepared that can be read by others who use this guide.

1.2 The format specified in this guide is used for the exchange of data between computer programs, users, agencies, etc. It is not necessary that test data for internal use be stored in this format, only that a program adhering to this guide have the capability to read, or write test data in this format, or both.

1.3 This guide does not cover digital geospatial data which is treated Specification D 5714.

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.*

1.5 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 ASTM Standards:

D 653 Terminology Relating to Soil, Rock, and Contained Fluids²

D 5714 Specification for Content of Digital Geospatial Metadata³

¹ This guide is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.95 on Information Retrieval and Data Automation.

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² *Annual Book of ASTM Standards*, Vol 04.08.

³ *Annual Book of ASTM Standards*, Vol 04.09.

E 1013 Terminology Relating to Computerized Systems⁴

2.2 ANSI Standards:

ANSI X3.30 Representation for Calendar Date and Ordinal Date for Information Interchange⁵

ANSI X3.43 Representation for Time for Information Interchange⁵

2.3 NIST Standard:

Federal Information Processing Standard 173 in SDTS 70-1, Spatial Data Transfer Standard, U.S. Department of Commerce, NIST⁶

3. Terminology

3.1 Definitions:

3.1.1 Definitions follow those in Terminology **D 653**. Computer related terms are defined in Terminology **E 1013**.

3.2 Definitions of Terms Specific to This Standard—The following definitions apply to their use in this guide:

3.2.1 *data element, n*—a logically basic item of data.

3.2.2 *data group, n*—a collection of data elements which are related.

3.2.3 *group, n*—a collection of related information about a test.

4. Significance and Use

4.1 Computers are becoming an integral part of each testing laboratory. A variety of automated test devices which collect and store data now exist. A variety of software programs to perform calculations and produce reported results are used. There is no consistency in the formats used to store data. Consequently, it is time consuming and expensive to exchange computerized test data files among organizations.

4.2 This guide presents a standard yet versatile format that can be used to exchange data across systems.

4.3 This guide defines the principal data elements that are considered important and worth recording and storing permanently in a computerized data storage system from which larger databases may be prepared. These data elements are not intended to be requirements of any specific or single database.

⁴ *Annual Book of ASTM Standards*, Vol 14.01.

⁵ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁶ Available from NIST, Gaithersburg, MD 20899

The format permits only those elements that a specific user may require. Additional data elements may be added using the general outline of this guide. Those elements must be added in a manner consistent with the definitions in this guide, such that a computer program written to follow this guide can successfully read the entire data file, including one that contains data elements not identified in this guide.

4.4 This guide does not define how to obtain and record specific data. That activity is covered by each specific test method.

4.5 This guide may be incomplete for some applications. It is intended that additions to the formats will be made as requests come from each ASTM subcommittee responsible for a particular standard. Those additions will be made without rendering older files unreadable.

4.6 The recommended format in this guide does not require that all data elements be included in the data base. A user may elect to omit any data element without affecting the ability of the file format structure to work. However, those elements that are required in the report section of the relevant ASTM standard should be included in the standardized data file.

4.7 Following ASTM recommended practice, all data are stored in SI units.

5. Data Types

5.1 Four types of data are recognized in this format: numerical, date, time, and character.

5.1.1 Numerical data are data consisting only of the symbols 0–9 and a decimal point. A decimal point is not required for a whole number.

5.1.2 Date data consist of ten characters in the format YYYY/MM/DD where YYYY is the year, MM is the numerical value of the month from 01 to 12, and DD is the numerical value of the day of the month from 01 to 31 (see [ANSI X3.30](#)) (adopted as Federal Information Processing Standard 4–1). Date data must contain two slash marks to distinguish the data as date data.

5.1.3 Time data consist of at least eight characters in the format HR:MM:SS.xxx where HR is the hour of the day from 00 to 24, MM is the minute from 00 to 59, and SS.xxx is the second from 00 to 59 with fractions of a second added as a decimal value ([ANSI X3.43](#)). Any number of digits may follow the decimal point for fractions of a second. Time values must contain two colons as shown to distinguish the data as time data.

5.1.4 Character data consist of any ASCII standard keyboard characters.

5.1.5 Multiple spaces and tabs are acceptable in the data. Spaces and tabs may be used to store data in columns to make them more readable.

5.1.6 Commas should be avoided in the data fields except for the Test Data and Test Results fields where commas are used to delineate data.

5.1.7 All numeric data are given in SI units.

6. Start and End Identifiers

6.1 The first two lines of any file written to this standard shall contain a line that indicates the version of this standard used to create that file. The lines shall be of the following form:

****Format_Identification**

Format_Id=ASTM-D XXXX— YY

where xxxx is the standard number assigned by ASTM and yy is the last two digits of the year of adoption of this version.

6.2 The last line for a set of test data shall contain the identifier, ****End_Test**. Additional sets of test data may be placed in the same file by starting again with the standard format information given in [6.1](#)

7. Recommended Formats for Standard Data Groups

7.1 The following groups of information are included in the recommended format. The name in parentheses is the assigned group name.

7.1.1 *Test Identification (Test_Identification)*—This group covers information about the type of test and test standard used to run the test. [Table 1](#) gives the recommended standardized data format for Test Identification.

7.1.2 *Laboratory Information (Lab_Information)*—This group covers information about the laboratory performing the test. [Table 2](#) gives the recommended standardized data format for Laboratory Information.

7.1.3 *Sample Information (Sample_Information)*—This group covers information about the site, client and location of the sample. [Table 3](#) gives the recommended standardized data format for Sample Information.

7.1.4 *Specimen Information (Specimen_Information)*—This group covers information about the specimen used for the test. [Table 4](#) give the recommended standardized data format for Specimen Information.

7.1.5 *Test Parameters and Procedures (Test_Parameters)*—This group covers information about the test specific parameters and procedures. [Table 5](#) give the recommended standardized data format for Test Parameters.

7.1.6 *Test Data (Test_Data)*—This group covers data taken for the test in its most elemental form. [Table 6](#) gives the recommended standardized data format for Test Data.

7.1.7 *Test Results (Test_Results)*—This group covers test results, that is, the reduced and corrected final value(s) obtained by the test method. [Table 7](#) gives the recommended standardized data format for Test Results.

7.1.8 *Test Validation (Test_Validation)*—This group covers information relevant to quality control for the test. [Table 8](#) gives the recommended standardized data format for Test Validation.

TABLE 1 Standardized Data Format for Test Identification

**Test_Identification				
Data Description	Data Element Name	Data Type	Units	Example
Type of Test	Test_Type	CHAR	none	Unconfined Compression ASTM-D 2166-90
Test Method Number	Test_Method	CHAR	none	
Unique Identification Number	Test_Numbers	CHAR	none	UC-0098
Remarks about Test	Test_Remarks	CHAR	none	Test_Remarks=QA Test



TABLE 2 Standardized Data Format for Laboratory Information

**Lab_Information				
Data Description	Data Element Name	Data Type	Units	Example
Name of Laboratory	Lab_Name	CHAR	none	ABC Testing Services
Location of Laboratory	Lab_Location	CHAR	none	Any Place, AA
Remarks about Laboratory	Lab_Remarks	CHAR	none	Lab_Remarks=In room 3

7.2 The start of a data group is indicated with a ** followed by the assigned group name. For example, the start of sample information is indicated by: **Sample_Information

7.2.1 Any group information may be left out.

7.3 Groups may appear in any order.

8. Recommended Formats for Standard Data Elements Except for Test Data and Test Results

8.1 **Tables 1-8** identify the standard data elements within each data group. Data for data elements, except for Test Data and Test Results, are defined by the data element name followed by an equals sign (=) followed by the value for the data. Spaces and tabs may be used before and after the equal sign and before the data element name. For example, the test method is given within the Group Name, Test Identification as follows:

```
**Test_Identification
Test_Method=ASTM D 2166-90
```

or alternatively:

```
**Test_Identification
Test_Method= ASTM D 2166-90
```

Spaces and tabs may not be used within the data element name or the Group Name or within certain identifying information such as the ASTM designation. Commas may not be used in the data value field.

9. Recommended Formats for Standard Data Elements for Test Data

9.1 **Table 6** identifies the standard data elements within the Test Data group. This group includes the basic data recorded for the test and calibration factors to convert that data to test results.

9.2 The number of data values per set of readings in the Test Data group (number of columns of readings) must be identified using the Number_Data_Values parameter. Date counts as a data value, if included. Time counts as a data value, if included. This parameter must appear before any data are given. It tells the software how many data elements to read from each line of data.

9.3 Titles for the data may be given with the Data_Title_n parameter.

9.4 Calibration information to convert test data to test results may be given with the Offset_m and Calibration_m parameters. If no Offset_m is given, it is assumed to be zero. If no Calibration_m is given, it is assumed to be 1.

9.5 All data related to one set of readings are placed on the same line. Each line must contain the same number of entries which must equal Number_Data_Values. Each line must start with the label, DATA=. A comma is required between each data

entry. A null value can be indicated by placing two commas together with no information between the commas. Extra spaces or tabs, or both, may be used between data values to make the data easier to read. Any line containing more or fewer values than Number_Data_Values is ignored. An error message is printed displaying the line and the message that its contents are ignored.

9.6 A data set is ended by any line that starts with characters other than DATA=. A test may consist of multiple sets of data that represent different phases or steps of a test.

10. Recommended Formats for Standard Data Elements for Test Results

10.1 **Table 7** identifies the standard data elements within the Test Results group. This group includes the final test results obtained for the test.

10.2 The number of data results per set of readings in the Test Results group (number of columns of data) must be identified using the Number_Results_Values parameter. Date counts as a value, if included. Time counts as a value, if included. This parameter must appear before any results are given. It tells the software how many results elements to read from each line of data.

10.3 Titles for the results may be given with the Results_Title_n parameter.

10.4 All results related to one set of readings are placed on the same line. Each line must contain the same number of entries which must equal Number_Results_Values. Each line must start with the label, RESULT=. A comma is required between each data entry. A null value can be indicated by placing two commas together with no information between the commas. Extra spaces or tabs, or both, may be used between data values to make the data easier to read. Any line containing more or fewer values than Number_Results_Values is ignored. An error message is printed displaying the line and the message that its contents are ignored.

10.5 A set of results is ended by a line that starts with any characters other than RESULTS=. A test may consist of multiple sets of results that represent different phases or steps of a test.

11. Rules for Writing Exchange Files

11.1 Contents of exchange files should follow this guide as closely as possible to minimize inconsistencies with other software.

11.2 If the user must include a parameter not provided for in this guide, that may be done by defining a user specific parameter that follows the general format established in this guide. However, that parameter and its associated data will not be recognized by programs which adhere to this standard. Its contents will be ignored by any programs which adhere to this guide.

11.3 A comma is required between each data entry for Test_Data and Test_Results. A null value can be indicated by placing two commas together with no information between the commas.

11.4 Tabs and spaces may be added to the before data element names and data to enhance the visual appearance of the information in the file.