



Standard Guide for Defining the Test Result of a Test Method¹

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1. Scope

1.1 The purpose of this guide is to provide guidelines for identifying the elements that comprise the test result of a test method and to illustrate how these elements combine into the test result.

1.2 Types of measurement scales used for expressing observations and test results are discussed.

1.3 No system of units is specified in this standard.

2. Referenced Documents

2.1 *ASTM Standards:*²

[E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods](#)

[E456 Terminology Relating to Quality and Statistics](#)

2.2 *ISO Standard:*³

[ISO 3534-2 Statistics—Vocabulary and Symbols, Part 2: Applied Statistics](#)

3. Terminology

3.1 *Definitions*—For a more extensive list of terms in E11 standards, refer to Terminology [E456](#).

3.1.1 *binary scale, n*—nominal scale with only two possible categories.

3.1.2 *characteristic, n*—a property of items in a sample or population which, when measured, counted or otherwise observed, helps to distinguish between the items.

3.1.3 *interval scale, n*—continuous scale or discrete scale with equal sized scale values and an arbitrary zero.

ISO 3534–2

3.1.4 *nominal scale, n*—scale with unordered labeled categories or ordered by convention.

ISO 3534–2

3.1.5 *observation, n*—the process of obtaining information regarding the presence or absence of an attribute of a test specimen, or of making a reading on a characteristic or dimension of a test specimen.

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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 Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, Case postale 56, CH-1211, Geneva 20, Switzerland, <http://www.iso.ch>.

3.1.5.1 *Discussion*—

Observation is also associated with the attribute or measurement information obtained from the process. The term “observed value” is preferred for this second usage.

3.1.6 *observed value, n*—the value obtained by making an observation.

3.1.7 *ordinal scale, n*—scale with ordered labeled categories.

ISO 3534–2

3.1.8 *ratio scale, n*—continuous scale with equal sized scale values and an absolute or natural zero point.

ISO 3534–2

3.1.8.1 *Discussion*—

Ratio scales consist of only non-negative values.

3.1.9 *scale, n*—system of reference values for a characteristic.

ISO 3534–2

3.1.10 *test determination, n*—the value of a characteristic or dimension of a single test specimen derived from one or more observed values.

3.1.11 *test method, n*—a definitive procedure that produces a test result.

3.1.11.1 *Discussion*—

Examples of test methods include, but are not limited to: identification, measurement, and evaluation of one or more qualities, characteristics, or properties.

ASTM Regulations 2.2.6

3.1.12 *test observation, n*—see *observation*.

3.1.13 *test result, n*—the value of a characteristic obtained by carrying out a specified test method.

3.1.13.1 *Discussion*—

The test method specifies that one or a number of individual observations be made, and their average or another appropriate function, (such as the median or the standard deviation), be reported as the test result. It can also require standard corrections to be applied, such as correction of gas volumes to standard temperature and pressure. Thus, a test result can be a result calculated from several observed values. In the simple case, the test result is the observed value itself.

ISO 3534-23534-2

3.1.14 *test specimen, n*—the portion of a test unit needed to obtain a single test determination.

3.1.14.1 *Discussion*—

When used for a physical test, this is sometimes called “test piece.” For a chemical test, it is sometimes called test portion or test sample. For optical and other tests, it is also sometimes called test sample. In interlaboratory evaluation of test methods and other statistical procedures, it is best to reserve the word sample for the whole amount of material involved and not the individual test specimens, pieces or portions being tested.

3.1.15 *test unit, n*—the total quantity of material (containing one or more test specimens) needed to obtain a test result as specified in the test method. (See *test result*.)

3.2 Definitions of Terms Specific to This Standard:

3.2.1 binary test result, n—a test result for which the final value is one of two possible categories.

3.2.2 ordinal test result, n—a test result where the final value is reported as one of the scale results on an ordinal scale.

4. Significance and Use

4.1 All test methods have an output in the form of a test result. This guide provides information on the construction of test results from more elemental measurements.

4.2 A well defined test result is necessary before any precision statements can be made about the test method.

4.2.1 Form and Style for ASTM Standards, Section A21, requires that every test method shall contain a statement regarding its precision, preferably as a result of an interlaboratory test program. Reporting of such studies is described in Practice E177, which illustrates the development of test results from observations and test determinations.

4.2.2 Precision statements for ASTM test methods are applicable to test results. They are not applicable to test determinations or observations, unless specifically and clearly indicated otherwise.

5. Scales

5.1 The test method must clearly identify the scale for measuring the test observations and reporting the test results. Measurement scales are classified into various types. The primary classification is into numerical or categorical scales. Numerical scales, also known as quantitative scales, are established in terms of a defined numerical range with specified scale divisions. Categorical scales, also known as qualitative scales, are defined in terms of words, but the categories may be assigned numbers for purposes of data analysis.

5.2 Measurement scales may be sub-classified into a hierarchal system denoted as nominal, ordinal, interval, and ratio scales as follows:

5.2.1 A nominal scale is an unordered categorical scale. Examples include blood types (A, B, O) or categories of defect types.