



Standard Terminology Relating to Quality and Statistics¹

This standard is issued under the fixed designation E456; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

^{ε1} NOTE—New terms were added in April 2024.

1. Scope

1.1 This standard is the general terminology standard for terms defined in the standards of Committee E11 on Quality and Statistics.

1.2 A term in this standard which lists an attribution to an E11 technical standard indicates that the standard is normative for that term. Any changes in the term definition in the normative standard will be editorially changed in this standard. Any terms added to an E11 standard will be editorially added to this standard with an attribution to that standard.

1.3 Term definitions that are similar to ISO 3534 will be noted in this standard, but ISO 3534 will not be considered normative for any E11 terms.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM E11 Standards with Terms in This Standard:²

- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E105 Guide for Probability Sampling of Materials
- E122 Practice for Calculating Sample Size to Estimate, With Specified Precision, the Average for a Characteristic of a Lot or Process
- E141 Practice for Acceptance of Evidence Based on the Results of Probability Sampling

¹ This terminology is under the jurisdiction of ASTM Committee E11 on Quality and Statistics and is the direct responsibility of Subcommittee E11.70 on Editorial/Terminology.

Current edition approved April 1, 2022. Published April 2022. Originally approved in 1972. Last previous edition approved in 2017 as E456 – 13a (2017)^{ε6}. DOI: 10.1520/E0456-13AR22E01.

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.

- E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods
- E178 Practice for Dealing With Outlying Observations
- E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method
- E1169 Practice for Conducting Ruggedness Tests
- E1325 Terminology Relating to Design of Experiments
- E1402 Guide for Sampling Design
- E1488 Guide for Statistical Procedures to Use in Developing and Applying Test Methods
- E1994 Practice for Use of Process Oriented AOQL and LTPD Sampling Plans
- E2234 Practice for Sampling a Stream of Product by Attributes Indexed by AQL
- E2281 Practice for Process Capability and Performance Measurement
- E2282 Guide for Defining the Test Result of a Test Method
- E2334 Practice for Setting an Upper Confidence Bound for a Fraction or Number of Non-Conforming items, or a Rate of Occurrence for Non-Conformities, Using Attribute Data, When There is a Zero Response in the Sample
- E2489 Practice for Statistical Analysis of One-Sample and Two-Sample Interlaboratory Proficiency Testing Programs
- E2554 Practice for Estimating and Monitoring the Uncertainty of Test Results of a Test Method Using Control Chart Techniques
- E2555 Practice for Factors and Procedures for Applying the MIL-STD-105 Plans in Life and Reliability Inspection
- E2586 Practice for Calculating and Using Basic Statistics
- E2587 Practice for Use of Control Charts in Statistical Process Control
- E2655 Guide for Reporting Uncertainty of Test Results and Use of the Term Measurement Uncertainty in ASTM Test Methods
- E2696 Practice for Life and Reliability Testing Based on the Exponential Distribution
- E2709 Practice for Demonstrating Capability to Comply with an Acceptance Procedure
- E2762 Practice for Sampling a Stream of Product by Variables Indexed by AQL
- E2782 Guide for Measurement Systems Analysis (MSA)



E2819 Practice for Single- and Multi-Level Continuous Sampling of a Stream of Product by Attributes Indexed by AQL

E2935 Practice for Evaluating Equivalence of Two Testing Processes

E3080 Practice for Regression Analysis with a Single Predictor Variable

E3159 Guide for General Reliability

E3264 Guide for Homogeneity of Samples and Reference Materials Used for Inter- and Intra-Laboratory Studies

2.2 *ISO Standards*.³

**ISO 3534 Statistics—Vocabulary and Symbols
Part 2 Applied Statistics**

3. Terminology

acceptance quality limit (AQL), *n*—quality limit that is the worst tolerable process average when a continuing series of lots is submitted for acceptance sampling. **E2234**

accepted reference value, *n*—a value that serves as an agreed-upon reference for comparison, and which is derived as: (1) a theoretical or established value, based on scientific principles, (2) an assigned or certified value, based on experimental work of some national or international organization, or (3) a consensus or certified value, based on collaborative experimental work under the auspices of a scientific or engineering group. **E177**

accuracy, *n*—the closeness of agreement between a test result and an accepted reference value. **E177**

aliases, *n*—in a fractional factorial design, two or more effects which are estimated by the same contrast and which, therefore, cannot be estimated separately. **E1325**

alternative hypothesis, H_a , *n*—a probability distribution or type of probability distribution distinguished from the null hypothesis. **E2586**

analysis of variance (ANOVA), *n*—statistical models and associated procedures, in which the observed variance is partitioned into components due to different explanatory variables. **E1325**

analysis of variance table, *n*—a tabular summary of results from a regression model or an experimental design for the purpose of evaluating effects of factors. **E1325**

area sampling, *n*—probability sampling in which a map, rather than a tabulation of sampling units, serves as the sampling frame. **E1402**

assignable cause, *n*—factor that contributes to variation in a process or product output that is feasible to detect and identify (see **special cause**). **E2587**

attributes data, *n*—observed values or test results that indicate the presence or absence of specific characteristics or counts of occurrences of events in time or space. **E2587**

attributes, method of, *n*—measurement of quality by the method of attributes consists of noting the presence (or absence) of some characteristic or attribute in each of the units in the group under consideration, and counting how many units do (or do not) possess the quality attribute, or how many such events occur in the unit, group, or area. **E2334**

audit subsample, *n*—a small subsample of a sample selected for review of all sample selection and data collection procedures. **E141**

average outgoing quality (AOQ), *n*—the average percent defective of outgoing product including all accepted lots or batches, after any defective units found in them are replaced by acceptable units, plus all lots or batches which are not accepted after such lots or batches have been effectively 100 % inspected and all defective units replaced by acceptable units. **E1994**

average outgoing quality limit (AOQL), *n*—the maximum of the AOQs for all possible incoming percentages defective for the process, for a given acceptance sampling plan. **E1994**

average quality protection, *n*—a type of protection in which there is prescribed some chosen value of average percent defective in the product after inspection (average outgoing quality limit (AOQL), that shall not be exceeded in the long run no matter what may be the level of percent defective in the product submitted to the inspector. **E1994**

average run length (ARL), *n*—the average number of times that a process will have been sampled and evaluated before a shift in process level is signaled. **E2587**

B_p life, *n*—for continuous variables, the life at which there is a probability (expressed as a percentage) of failure at or less than this value. **E3159**

balanced incomplete block design (BIB), *n*—an incomplete block design in which each block contains the same number *k* of different versions from the *t* versions of a single principal factor arranged so that every pair of versions occurs together in the same number, λ , of blocks from the *b* blocks. **E1325**

bias, *n*—the difference between the expectation of the test results and an accepted reference value. **E177**

binary scale, *n*—nominal scale with only two possible categories. **E2282**

binary test result, *n*—a test result for which the final value is one of two possible categories. **E2282**

block factor, *n*—a factor that indexes division of experimental units into disjoint subsets. **E1325**

bulk sampling, *n*—sampling to prepare a portion of a mass of material that is representative of the whole. **E1402**

c chart, *n*—control chart that monitors the count of occurrences of an event in a defined increment of time or space. **E2587**

³ Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <http://www.iso.org>.