



Standard 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 Sample¹

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1. Scope

1.1 This practice presents methodology for the setting of an upper confidence bound regarding a unknown fraction or quantity non-conforming, or a rate of occurrence for nonconformities, in cases where the method of attributes is used and there is a zero response in a sample. Three cases are considered.

1.1.1 The sample is selected from a process or a very large population of discrete items, and the number of non-conforming items in the sample is zero.

1.1.2 A sample of items is selected at random from a finite lot of discrete items, and the number of non-conforming items in the sample is zero.

1.1.3 The sample is a portion of a continuum (time, space, volume, area etc.) and the number of non-conformities in the sample is zero.

1.2 Allowance is made for misclassification error in this standard, but only when misclassification rates are well understood or known and can be approximated numerically.

2. Referenced Documents

2.1 ASTM Standards:²

E 141 Practice for Acceptance of Evidence Based on the Results of Probability Sampling

E 456 Terminology Relating to Quality and Statistics

E 1402 Terminology Relating to Sampling

E 1994 Practice for Use of Process Oriented AOQL and LTPD Sampling Plans

2.2 ISO Standards:

ISO 3534-1 Statistics—Vocabulary and Symbols, Part 1:

Probability and General Statistical Terms³

ISO 3534-2 Statistics—Vocabulary and Symbols, Part 2: Statistical Quality Control³

NOTE 1—Samples discussed in this standard should meet the requirements (or approximately so) of a probability sample as defined in Terminologies E 1402 or E 456.

3. Terminology

3.1 Definitions:

3.1.1 *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 of the units do (or do not) possess the quality attribute, or how many such events occur in the unit, group or area. **E 456**

3.1.2 *confidence bound, n*—see *confidence limit*.

3.1.3 *confidence coefficient, n*—the value, C , of the probability associated with a confidence interval or statistical coverage interval. It is often expressed as a percentage.

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3.1.4 *confidence level, n*—see *confidence coefficient*.

3.1.5 *confidence limit, n*—each of the limits, T_1 and T_2 , of the two sided confidence interval, or the limit T of the one sided confidence interval.

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3.1.6 *one sided confidence interval, n*—when T is a function of the observed values such that, θ being a population parameter to be estimated, the probability $P(T \geq \theta)$ or the probability $P(T \leq \theta)$ is at least equal to C where C is a fixed positive number less than 1. The interval from the smallest value of θ up to T or the interval from T to the largest possible value of θ is a one sided, C , confidence interval for θ .

ISO 3534-1

3.1.7 *confidence limit, n*—each of the limits, T_1 and T_2 , of the two sided confidence interval, or the limit T of the one sided confidence interval.

ISO 3534-1

¹ This practice is under the jurisdiction of ASTM Committee E11 on Quality and Statistics and is the direct responsibility of Subcommittee E11.10 on Sampling.

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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 American National Standards Institute, 11 W. 42nd Street, 13th Floor, New York, NY 10036.