

ANSI/ISO/ASQC A3534-2-1993

AMERICAN NATIONAL STANDARD

Statistics—Vocabulary and Symbols— Statistical Quality Control



AMERICAN SOCIETY FOR QUALITY CONTROL
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Statistics—Vocabulary and Symbols— Statistical Quality Control

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American Society for Quality Control Standards Committee
for
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Foreword

(This foreword is not part of American National Standard ANSI/ISO/ASQC A3534-2-1993, *Statistics—Vocabulary and Symbols—Statistical Quality Control*.)

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and nongovernmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75% of the member bodies casting a vote.

International Standard ISO 3534-2 was prepared by Technical Committee ISO/TC 69, *Applications of statistical methods*, Subcommittee SC 1, *Terminology and symbols*. ISO 3534 consists of the following three parts, under the general title *Statistics—Vocabulary and symbols*:

- Part 1: *Probability and general statistical terms*
- Part 2: *Statistical quality control*
- Part 3: *Design of experiments*

The United States Technical Advisory Group (TAG) to ISO/TC 69 is active in all of the activities of this committee. It seeks to ensure that all standards written by ISO/TC 69 are consistent with United States interests. This is done by representative membership on the U.S. TAG, by circulating drafts of proposed standards widely in the United States for comment, and by ensuring that these comments are considered by the appropriate ISO/TC 69 working group. By these means, most new or revised International Standards can be adopted readily as American National Standards. Although there are editorial changes to incorporate American language usage and spelling, the American National Standards are equivalent to the corresponding ISO Standards. To demonstrate this equivalent, the numerical designation of the American National Standards is the same numerical designation as the corresponding International Standard with a prefix such as A, in this case A3534-2.

Annex A forms an integral part of ANSI/ISO/ASQC 3534-2-1993.

The first editions of ANSI/ISO/ASQC A3534-1-1993 and ANSI/ISO/ASQC A3534-2-1993 serve as partial replacement for ANSI/ASQC A1, *Definitions, Symbols, Formulas, and Tables for Control Charts* and ANSI/ASQC A2, *Terms, Symbols, and Definitions for Acceptance Sampling*, which have been withdrawn.

Comments concerning this standard will be welcome and considered in future standards development and revision. They should be sent to the Standards Administrator, American Society for Quality Control, 611 East Wisconsin Avenue, Milwaukee, Wisconsin 53202.

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STATISTICS—VOCABULARY AND SYMBOLS— STATISTICAL QUALITY CONTROL

1 SCOPE

ANSI/ISO/ASQC A3534-2-1993 defines statistical quality control terms which may be used in the drafting of other International Standards and American National Standards.

The terms are classified under the following main headings:

—General statistical and quality control terms,

—Sampling and acceptance sampling terms,

—Terms relating to process measures.

The entries in ANSI/ISO/ASQC A3534-2-1993 are arranged analytically and an alphabetical index is provided.

Annex A gives a list of symbols and abbreviations used in ANSI/ISO/ASQC A3534-2-1993.

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SECTION 1: GENERAL STATISTICAL AND QUALITY CONTROL TERMS**1.1 Process and quality**

1.1.1 process: Method of operation in any particular stage of any element, group of elements, or total aspect of production or service.

NOTE—It is necessary to distinguish between an individual and an overall process.

1.1.1.1 individual process: A specific combination of one machine (production line or tool), one manufacturing method, one uniform batch of material, and one operator (or group of operators) manufacturing products or providing service over any period of time under stated circumstances.

1.1.1.2 overall process: Any combination of machines (lines or tools), manufacturing methods, materials, and operators manufacturing products or providing service over any period of time under stated circumstances.

1.1.2 quality¹⁾: The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs.

1.1.3 grade¹⁾: An indicator of category or rank related to features or characteristics that cover different sets of needs for products or services intended for the same functional use.

1.1.4 quality assurance¹⁾: All those planned and systematic actions necessary to provide adequate confidence that a product, process, or service will satisfy given requirements for quality.

1.1.5 quality control¹⁾: Operational techniques and activities that are used to fulfill requirements for quality.

1) This term has been defined in ISO 8402, *Quality—Vocabulary*, in which explanatory notes may be found. Since ISO 8402 is the prime source for the definition of this term, any update to ISO 8402 with respect to this term shall be considered as superseding the definition given in ANSI/ISO/ASQC A3534-2-1993.

1.1.6 process quality control; process control: That part of quality control that is concerned with maintaining the product, process, or service characteristics, within specified limits.

1.1.7 statistical quality control: That part of quality control in which statistical techniques are used.

NOTES

- 1 These techniques include the use of frequency distributions, measures of central tendency and dispersion, control charts, acceptance sampling, regression analysis, tests of significance, etc.
- 2 When statistical quality control is used to control the operation of a process rather than to control the quality of materials supplied, the term "statistical process control" is often used.

1.1.8 quality level: Any relative quality measure obtained by comparing observed values with the relevant requirements.

NOTES

- 1 Usually a numerical value indicating either the degree of conformity or nonconformity, especially for specification or sampling inspection purposes.
- 2 Where possible, a more precise term should be used, e.g., "proportion conforming," "fraction nonconforming," "acceptable quality level."

See *process level* (3.1.1).

1.1.9 quality measure: A quantitative measure of one or more quality characteristics.

NOTES

- 1 Two or more quality measures may be required to specify one aspect of quality.
- 2 Quantitative measures may take a variety of forms, such as physical and chemical measurement, the percentage of products not conforming to specifications, a demerit index, etc. Quality measures are used in technical applications in order to provide needed analytical information useful for control and acceptance purposes. Some are used to evaluate the conformance of individual items to specifications, while others are used to interpret quality in terms of the percentage of conforming or nonconforming items in a lot, etc.

See *quality level* (1.1.8).

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1.1.10 acceptance criteria: Specification criteria for acceptance of individual product or service characteristics.

NOTE—Sometimes, as in *acceptance sampling* (2.3.1), the term “acceptance criteria” is used for a set of several characteristics rather than an individual characteristic.

1.2 Inspection operations

1.2.1 inspection¹⁾: Activities such as measuring, examining, testing, and gauging one or more characteristics of a product or service, and comparing with specified requirements to determine conformity.

1.2.2 process inspection: Inspection of a process by examination of the process itself or of the product characteristics at the appropriate stage(s) of the process.

1.2.3 acceptance inspection: Inspection to determine whether an item or lot delivered or offered for delivery is acceptable.

1.2.4 lot-by-lot inspection: Inspection of product submitted in a series of lots.

1.2.5 100% inspection: Inspection of every item of product or service, i.e., the whole (as contrasted with any form of sampling inspection).

See *screening inspection* (1.2.6).

1.2.6 screening inspection: 100% inspection of material or items of a product, with rejection of all items or portions found nonconforming.

NOTES

- 1 Screening inspection might only be concerned with one particular kind of nonconformity.
- 2 Screening may be carried out for the purpose of removing nonconforming items from a lot or batch which was not accepted.

See *100% inspection* (1.2.5).

1) This term has been defined in ISO 8402, *Quality—Vocabulary*, in which explanatory notes may be found. Since ISO 8402 is the prime source for the definition of this term, any update to ISO 8402 with respect to this term shall be considered as superseding the definition given in ANSI/ISO/ASQC A3534-2-1993.

1.2.7 rectifying inspection: Removal or replacement of nonconforming items during inspection of all the items (or of some specified number of items) in a lot or batch which was not accepted by acceptance sampling.

1.2.8 indirect inspection: An acceptance inspection where a lot is accepted or rejected after examining and verifying the inspection system of the supplier and examining the results it provides; examination of samples from the submitted lot is thus omitted.

1.3 Sample and population terms

1.3.1 population: The totality of items under consideration.

NOTE—In the case of a random variable, the probability distribution is considered to define the population of that variable.

1.3.2 item; entity: That which can be individually described and considered.

NOTES

- 1 An entity may be, for example:
 - a physical item,
 - a defined quantity of material,
 - a service, an activity, or a process,
 - an organization or a person, or
 - some combination thereof.
- 2 In English, the term “unit” or “individual” should not be used instead of “entity” or “item.”
- 3 In French, the term “individu” may be used instead of “entité” in statistics.
- 4 The term “unit” is often used as a synonym for “item,” but in this American National Standard the term “item” is used to avoid confusion with the term “sampling unit.”
- 5 In sampling bulk material, an item is usually a defined quantity of material (e.g., a scoopful of powder, a specified weight, or a specified volume). Then the lot size is the number of these units in the lot.

1.3.3 sampling unit:

- (1) One of the individual units into which a population is divided.

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(2) A quantity of product, material, or service forming a cohesive entity and taken from one place at one time to form part of a sample.

NOTES

- 1 A sampling unit may contain more than one item to be tested, e.g., a packet of cigarettes, but one test result or observation will be obtained from it.
- 2 The unit of a product may be a single item, a pair, or a set of items, or it may be a specified quantity of material, such as a length of round brass rod, a volume of paint, or a weight of coal. It need not be the same as the unit of purchase, supply, production, or shipment.

1.3.4 (production) batch: A definite quantity of some commodity or service produced at one time under conditions that are presumed uniform.

NOTE—The circumstances under which the conditions can be presumed uniform cannot be generally stated; for example, a change in the material or tool used or an interruption in the manufacturing process can give rise to different conditions.

See also *inspection lot* (1.3.5), *consignment* (1.3.7), and *order* (1.3.8).

1.3.5 (inspection) lot: A definite quantity of some product, material, or service, collected together and submitted for examination.

NOTE—An inspection lot may consist of several batches or parts of batches.

See also *consignment* (1.3.7) and *order* (1.3.8).

1.3.6 lot size: The number of items in a lot.

1.3.7 consignment: A quantity of some commodity or service delivered at one time and covered by one set of documents.

NOTE—A consignment may consist of several lots or parts of lots.

See also *batch* (1.3.4), *order* (1.3.8), and *item* (1.3.2).

1.3.8 order: A quantity of a product, material, or service, ordered at one time from one producer.

NOTE—An order may consist of one or more consignments.

See *batch* (1.3.4) and *inspection lot* (1.3.5).

1.3.9 subgroup (object sense): One of the sets of items or quantities of material obtained by subdividing a larger group of items or quantities of material.

1.3.10 subgroup (measurement sense): One of the sets of groups of observations obtained by subdividing a larger group of observations.

1.3.11 rational subgroup: In an ordered sequence, one of the subgroups within which variations may be considered to be due to nonassignable chance causes only, but between which there may be variations due to assignable causes the presence of which is considered both possible and important to detect.

1.3.12 pilot lot: A small lot run through the normal manufacturing processes before the first lot of routine production in order to gain information and experience.

1.3.13 unique lot: A lot produced under conditions unique to that lot and not part of a routine production sequence.

See *isolated lot* (1.3.14).

1.3.14 isolated lot: A lot separated from the sequence of lots in which it was produced or collected and not forming part of a current sequence of inspection lots.

See *unique lot* (1.3.13).

1.3.15 isolated sequence of lots: A group of lots in sequence but not forming part of a large sequence or continuing process.

1.4 Specification terms

1.4.1 specification¹⁾: Document that prescribes the requirements with which the product, process, or service has to conform.

¹⁾ This term has been defined in ISO 8402, *Quality—Vocabulary*, in which explanatory notes may be found. Since ISO 8402 is the prime source for the definition of this term, any update to ISO 8402 with respect to this term shall be considered as superseding the definition given in ANSI/ISO/ASQC A3534-2-1993.