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Sampling procedures for inspection by attributes —

Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

ICS 03.120.30

National foreword

This British Standard is the UK implementation of ISO 2859-1:1999, incorporating amendment 1:2011 and corrigendum March 2001.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by [A1] 〈A1〉.

The UK participation in its preparation was entrusted to Technical Committee SS/5, Acceptance Sampling Schemes.

A list of organizations represented on this committee can be obtained on request to its secretary.

This document does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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INTERNATIONAL STANDARD

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Sampling procedures for inspection by attributes —

Part 1:
Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

Règles d'échantillonnage pour les contrôles par attributs —

Partie 1: Procédures d'échantillonnage pour les contrôles lot par lot, indexés d'après le niveau de qualité acceptable (NQA)

Reference number
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Foreword

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 non-governmental, 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 2859-1 was prepared by Technical Committee ISO/TC 69, *Applications of statistical methods*, Subcommittee SC 5, *Acceptance sampling*.

This second edition of ISO 2859-1 cancels and replaces the first edition (ISO 2859-1:1989) of which it constitutes a technical revision.

Significant changes in this edition include:

— a new procedure for switching from normal to reduced inspection;

— a reference to skip-lot sampling as an alternative to reduced inspection;

— the term "limiting quality" has been changed to "consumer's risk quality" in the heading of Tables 6-A, 6-B, 6-C, 7-A, 7-B and 7-C;

— a new table has been added giving producer's risk as the probability of rejection of lots with percent nonconforming equal to the AQL;

— optional fractional acceptance number plans have been added; the purpose of these plans is to provide a consistent progression from the plans for acceptance number zero to the acceptance number 1 plans. The fractional acceptance number plans are found in Tables 11-A, 11-B and 11-C, where they take the place of the arrows in the corresponding positions in tables 2-A, 2-B and 2-C;

— reduced plans have been changed to eliminate the gap between the acceptance and rejection numbers;

— some changes have been made to the double sampling plans to provide a smaller average sample size;

— multiple sampling plans have been changed to five stages rather than seven. The change has not increased the average sample size. Some of the new plans have a smaller average sample size than their counterparts in the previous edition;

— scheme operating characteristic curves have been added as Table 12.

— Amendment 1 to ISO 2859-1:1999 accommodates the scoring roles of switching.

ISO 2859 consists of the following parts, under the general title *Sampling procedures for inspection by attributes*:

—

— *Part 1:Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

— *Part 2: Sampling plans indexed by limiting quality (LQ) for isolated lot inspection*

— *Part 3: Skip-lot sampling procedures*

— *Part 4: Procedures for assessment of declared quality levels*

— *Part 5: System of sequential sampling plans indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

It is highly recommended that this part of ISO 2859 be used together with ISO 2859-10, which contains illustrative examples.

Annex A of this part of ISO 2859 is for information only.

Sampling procedures for inspection by attributes —

Part 1:
Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

1 Scope

1.1 This part of ISO 2859 specifies an acceptance sampling system for inspection by attributes. It is indexed in terms of the acceptance quality limit (AQL).

Its purpose is to induce a supplier through the economic and psychological pressure of lot non-acceptance to maintain a process average at least as good as the specified acceptance quality limit, while at the same time providing an upper limit for the risk to the consumer of accepting the occasional poor lot.

Sampling schemes designated in this part of ISO 2859 are applicable, but not limited, to inspection of

— end items,

— components and raw materials,

— operations,

— materials in process,

— supplies in storage,

— maintenance operations,

— data or records, and

— administrative procedures.

1.2 These schemes are intended primarily to be used for a continuing series of lots, that is, a series long enough to allow the switching rules (9.3) to be applied. These rules provide:

a) a protection to the consumer (by means of a switch to tightened inspection or discontinuation of sampling inspection) should a deterioration in quality be detected;

b) an incentive (at the discretion of the responsible authority) to reduce inspection costs (by means of a switch to reduced inspection) should consistently good quality be achieved.

Sampling plans in this part of ISO 2859 may also be used for the inspection of lots in isolation but, in this case the user is strongly advised to consult the operating characteristic curves to find a plan that will yield the desired protection (see 12.6). In that case, the user is also referred to the sampling plans indexed by limiting quality (LQ) given in ISO 2859-2.

2 Normative references

[A1] The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2859-3, *Sampling procedures for inspection by attributes Đ Part 3: Skip-lot sampling procedures*

ISO 3534-1, *Statistics Đ Vocabulary and symbols Đ Part 1: General statistical terms and terms used in probability*

ISO 3534-2, *Statistics Đ Vocabulary and symbols Đ Part 2: Applied statistics* [A1]

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this part of ISO 2859, the terms and definitions given in ISO 3534-1 and ISO 3534-2 and the following apply.

NOTE For ease of reference, the definitions of some of these terms are quoted from ISO 3534-1 and ISO 3534-2, while others are redefined or newly defined.

3.1.1
inspection
activity such as measuring, examining, testing or gauging one or more characteristics of a product or service, and comparing the results with specified requirements in order to establish whether conformity is achieved for each characteristic

3.1.2
original inspection
first inspection of a lot according to the provisions of this part of ISO 2859

NOTE This is to be distinguished from the inspection of a lot which has been resubmitted after previous non-acceptance.

3.1.3
inspection by attributes
inspection whereby either the item is classified simply as conforming or nonconforming with respect to a specified requirement or set of specified requirements, or the number of nonconformities in the item is counted

NOTE Inspection by attributes includes inspection for conformity of items as well as inspection for number of nonconformities per hundred items.

3.1.4
item
that which can be individually described and considered

EXAMPLES

— a physical item;

— a defined quantity of material;

— a service, an activity or a process;

— an organization or a person; or

— some combination thereof.

3.1.5
nonconformity
non-fulfilment of a specified requirement

NOTE 1 In some situations specified requirements coincide with customer usage requirements (see **defect**, 3.1.6). In other situations they may not coincide, being either more or less stringent, or the exact relationship between the two is not fully known or understood.

NOTE 2 Nonconformity will generally be classified according to its degree of seriousness such as:

Class A: those nonconformities of a type considered to be of the highest concern; in acceptance sampling such types of nonconformities will be assigned a very small acceptance quality limit value;

Class B: those nonconformities of a type considered to have the next lower degree of concern; therefore, these can be assigned a larger acceptance quality limit value than those in class A and smaller than in class C, if a third class exists, etc.

NOTE 3 Adding characteristics and classes of nonconformities will generally affect the overall probability of acceptance of the product.

NOTE 4 The number of classes, the assignment into a class, and the choice of acceptance quality limit for each class, should be appropriate to the quality requirements of the specific situation.

3.1.6
defect
non-fulfilment of an intended usage requirement

NOTE 1 The term "defect" is appropriate for use when a quality characteristic of a product or service is evaluated in terms of usage (as contrasted to conformance to specifications).

NOTE 2 Since the term "defect" now has definite meaning within the law, it should not be used as a general term.

3.1.7
nonconforming item
item with one or more nonconformities

NOTE Nonconforming items will generally be classified by their degree of seriousness such as:

Class A: an item which contains one or more nonconformities of class A and may also contain nonconformities of class B and/or class C, etc.;

Class B: an item which contains one or more nonconformities of class B and may also contain nonconformities of class C, etc. but contains no nonconformity of class A.

3.1.8
percent nonconforming
⟨in a sample⟩ one hundred times the number of nonconforming items in the sample divided by the sample size, viz:

$$\frac{d}{n} \times 100$$

where

d is the number of nonconforming items in the sample;

n is the sample size

3.1.9
percent nonconforming
⟨in a population or lot⟩ one hundred times the number of nonconforming items in the population or lot divided by the population or lot size, viz: