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Sampling procedures for inspection by attributes

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

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National foreword

This British Standard is the UK implementation of ISO 2859-2:2020. It supersedes BS 6001-2:1993, which is withdrawn.

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INTERNATIONAL STANDARD

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Second edition
2020-02

Sampling procedures for inspection by attributes —

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

Règles d'échantillonnage pour les contrôles par attributs —

Partie 2: Plans d'échantillonnage pour les contrôles de lots isolés, indexés d'après la qualité limite (QL)

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 69, *Application of statistical methods*, Subcommittee SC 5, *Acceptance sampling*.

This second edition cancels and replaces the first edition (ISO 2859-2:1985), which has been technically revised.

The main changes compared to the previous edition are as follows:

— inclusion of a sampling plan for the number of nonconformities per item in the lot;

— extension of the range of preferred LQ values from the original range "0,5 0,8 1,25 2 3,15 5 8 12,5 20 31,5 to the new one "0,05 0,008 0,125 0,2 0,315 0,5 0,8 1,25 2 3,15 5 8 12,5 20 31,5 50 80 125 200 315 500 800 1 250 2 000 3 150";

— tables of shortest length confidence intervals for lot proportion nonconforming under confidence levels 0,95 and 0.99;

— new technical annexes: Annex A on "Statistical properties of single sampling plans", Annex B on "Calculation of the statistical indices" and Annex C on "Information on technical background of confidence intervals".

A list of all parts in the ISO 2859 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Sampling procedures for inspection by attributes —

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

1 Scope

This document specifies an acceptance sampling system for inspection by attributes indexed by limiting quality (LQ). The sampling system is used for lots in isolation (isolated sequences of lots, an isolated lot, a unique lot or a short series of lots), where switching rules, such as those of ISO 2859-1, are not applicable. Inspection levels, as provided by ISO 2859-1 to control the relative amount of inspection, are not provided in this document. In many industrial situations, in which switching rules might be used, they are not applied for a number of reasons, not all of which might be valid:

a) production is intermittent (not continuous);

b) production is from several different sources in varying quantities, i.e. "job lots";

c) lots are isolated;

d) lots are resubmitted after inspection.

The sampling plans in this document are indexed by a series of specified values of limiting quality (LQ), where the consumer's risk (the probability of acceptance at the LQ) is usually below 0,10 (10 %), except in some instances.

This document is intended both for inspection for nonconforming items and for inspection for nonconformities per 100 items.

It is intended to be used when the supplier and the consumer both regard the lot to be in isolation. That is, the lot is unique in that it is the only one of its type produced. It can also be used when there is a series of lots too short for switching rules to be applied.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

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

ISO 3534-2, *Statistics — Vocabulary and symbols — Part 2: Applied statistics*

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3 Terms and definitions, and symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2859-1, ISO 3534-1 and ISO 3534-2 apply. For ease of reference, some terms are quoted from these standards.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1.1
consumer´s risk
CR
probability of acceptance when the quality level has a value stated by the acceptance sampling plan as unsatisfactory

Note 1 to entry: For the purposes of this document, the consumer's risk is approximately 0,10 or 10 % in percent scale.

[SOURCE: ISO 3534-2:2006, 4.6.2, modified — The symbol has been deleted; the original Note has been deleted; and the new Note 1 to entry has been added.]

3.1.2
consumer's risk quality
CRQ
quality of a lot or process which, in the acceptance sampling plan, corresponds to a specified *consumer's risk* (3.1.1)

Note 1 to entry: For the purposes of this document, the consumer's risk quality is mostly equated to the *limiting quality (LQ)* (3.1.3).

[SOURCE: ISO 3534-2:2006, 4.6.9, modified — The symbol has been deleted; in the definition, "quality level of a lot or process" has been replaced with "quality of a lot or process"; the original Note has been deleted; and the new Note 1 to entry has been added.]

3.1.3
limiting quality
LQ
quality level, when a lot is considered in isolation, which, for the purposes of acceptance sampling inspection, is limited to a low probability of acceptance

[SOURCE: ISO 3534-2:2006, 4.6.13]

3.1.4
producer´s risk
PR
probability of non-acceptance when the quality level has a value stated by the plan as acceptable

Note 1 to entry: For the purposes of this document, the producer's risk is approximately 0,05 (5 %), and never exceeds 0,05 (5 %).

[SOURCE: ISO 3534-2:2006, 4.6.4, modified — The symbol has been deleted; the original Note 1 and Note 2 have been deleted; and the new Note 1 to entry has been added.]

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3.1.5
producer´s risk quality
PRQ
quality level of a lot or process which, in the acceptance sampling plan, corresponds to a specified *producer´s risk* (3.1.4)

[SOURCE: ISO 3534-2:2006, 4.6.10, modified — The symbol has been deleted; the original Note 1 and Note 2 have been deleted; and the new Note 1 to entry has been added.]

3.2 Symbols and abbreviated terms

Ac	acceptance number
CR (β)	consumer´s risk
CRQ	consumer's risk quality
D	number of nonconforming items (or nonconformities) in the population or lot
d	number of nonconforming items (or nonconformities) found in a sample from a lot
LQ	limiting quality
N	lot size
n	sample size
OC	operating characteristic
p	lot proportion nonconforming or average number of nonconformities per item in the lot
P	probability
P_a	probability of acceptance
PR (α)	producer´s risk
PRQ	producer´s risk quality
σ^2	variance of a statistical distribution
μ	mean of a statistical distribution

4 Choice of sampling plan

4.1 General

The following procedures shall be followed in advance of acceptance sampling.

a) The value of the limiting quality (LQ) shall be specified in accordance with 4.2.

b) The lot size shall be determined.

The sampling plan to be used shall be found in accordance with 4.3.

By reference to Tables 1 to 4, an applicable sampling plan is identified from the lot size (N) and the limiting quality (LQ).

With the specified lot size and the limiting quality as indexing values, the sample size n and the acceptance number Ac are given in Tables 1 to 4.

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Although the primary index to Tables 1 to 4 is the limiting quality (LQ), the producer/supplier needs guidance on the quality level required if lots are to have a high probability of acceptance.

Table 1 — Table of sampling plans — LQ from 0,05 to 0,8

Lot size		Limiting quality LQ in percentage nonconforming or average number of nonconformities per 100 items						
		0,05	0,08	0,125	0,2	0,315	0,5	0,8
16 to 25	*n*, Ac	→	→	→	→	→	→	→
26 to 50	*n*, Ac	→	→	→	→	→	→	→
51 to 90	*n*, Ac	→	→	→	→	→	→	→
91 to 150	*n*, Ac	→	→	→	→	→	→	150, 0
151 to 280	*n*, Ac	→	→	→	252, 0	252, 0	200, 0	170, 0
281 to 500	*n*, Ac	→	→	450, 0	450, 0	287, 0	280, 0	220, 0
501 to 1 200	*n*, Ac	1 080, 0	1 080, 0	720, 0	684, 0	510, 0	380, 0	255, 0
1 201 to 3 200	*n*, Ac	1 800, 0	1 710, 0	1 400, 0	956, 0	653, 0	430, 0	280, 0
3 201 to 10 000	*n*, Ac	3 690, 0	2 501, 0	1 676, 0	1 087, 0	699, 0	450, 0	315, 0
10 001 to 35 000	*n*, Ac	4 306, 0	2 762, 0	1 793, 0	1 132, 0	717, 0	500, 0	500, 1
35 001 to 150 000	*n*, Ac	4 535, 0	2 850, 0	1 830, 0	1 146, 0	800, 0	800, 1	500, 1
150 001 to 500 000	*n*, Ac	4 583, 0	2 869, 0	1 838, 0	1 250, 0	1 250, 1	800, 1	800, 3
>500 000	*n*, Ac	4 601, 0	2 876, 0	2 000, 0	2 000, 1	1 250, 1	1 250, 3	1 250, 5

Table 2 — Table of sampling plans — LQ from 1,25 to 31,5

Lot size		Limiting quality LQ in percentage nonconforming or average number of nonconformities per 100 items							
		1,25	2	3,15	5	8	12,5	20	31,5
16 to 25	*n*, Ac	→	→	→	25, 0	17, 0	13, 0	9, 0	6, 0
26 to 50	*n*, Ac	→	50, 0	50, 0	28, 0	22, 0	15, 0	10, 0	6, 0
51 to 90	*n*, Ac	90, 0	50, 0	44, 0	34, 0	24, 0	16, 0	10, 0	8, 0
91 to 150	*n*, Ac	90, 0	80, 0	55, 0	38, 0	26, 0	18, 0	13, 0	13, 1
151 to 280	*n*, Ac	130, 0	95, 0	65, 0	42, 0	28, 0	20, 0	20, 1	13, 1
281 to 500	*n*, Ac	155, 0	105, 0	80, 0	50, 0	32, 0	32, 1	20, 1	20, 3
501 to 1 200	*n*, Ac	170, 0	125, 0	125, 1	80, 1	50, 1	32, 1	32, 3	32, 5
1 201 to 3 200	*n*, Ac	200, 0	200, 1	125, 1	125, 3	80, 3	50, 3	50, 5	50, 10
3 201 to 10 000	*n*, Ac	315, 1	200, 1	200, 3	200, 5	125, 5	80, 5	80, 10	80, 18
10 001 to 35 000	*n*, Ac	315, 1	315, 3	315, 5	315, 10	200, 10	125, 10	125, 18	80, 18
35 001 to 150 000	*n*, Ac	500, 3	500, 5	500, 10	500, 18	315, 18	200, 18	125, 18	80, 18
150 001 to 500 000	*n*, Ac	800, 5	800, 10	800, 18	500, 18	315, 18	200, 18	125, 18	80, 18
>500 000	*n*, Ac	1 250, 5	1 250, 10	1 250, 18	800, 18	500, 18	315, 18	200, 18	125, 18

Table 3 — Table of sampling plans — LQ from 50 to 3 150, without correlation of nonconformities

Lot size		Limiting quality LQ in average number of nonconformities per 100 items (model without correlation of the nonconformities)									
		50	80	125	200	315	500	800	1 250	2 000	3 150
16 to 25	*n*, Ac	4, 0	3, 0	3, 1	2, 1	2, 3	2, 5	2, 10	2, 17	2, 29	2, 50
26 to 50	*n*, Ac	5, 0	5, 1	3, 1	3, 3	3, 5	3, 10	3, 17	2, 18	2, 29	2, 50
51 to 90	*n*, Ac	8, 1	5, 1	5, 3	5, 5	5, 10	5, 18	3, 18	2, 18	2, 29	2, 50
91 to 150	*n*, Ac	8, 1	8, 3	8, 5	8, 10	8, 18	5, 18	3, 18	2, 18	2, 29	2, 50
151 to 280	*n*, Ac	13, 3	13, 5	13, 10	13, 18	8, 18	5, 18	3, 18	2, 18	2, 29	2, 50
281 to 500	*n*, Ac	20, 5	20, 10	20, 18	13, 18	8, 18	5, 18	3, 18	3, 29	3, 50	3, 82

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Table 3 *(continued)*

Lot size		Limiting quality LQ in average number of nonconformities per 100 items (model without correlation of the nonconformities)									
		50	80	125	200	315	500	800	1 250	2 000	3 150
501 to 1 200	*n*, Ac	32, 10	32, 18	20, 18	13, 18	8, 18	5, 18	5, 31	5, 51	5, 84	5, 141
1 201 to 3 200	*n*, Ac	50, 18	32, 18	20, 18	13, 18	8, 18	8, 31	8, 51	8, 84	8, 141	8, 229
3 201 to 10 000	*n*, Ac	50, 18	32, 18	20, 18	13, 18	13, 31	13, 51	13, 84	13, 141	13, 229	13, 374
10 001 to 35 000	*n*, Ac	50, 18	32, 18	20, 18	20, 31	20, 51	20, 84	20, 141	20, 229	20, 374	20, 593
35 001 to 150 000	*n*, Ac	50, 18	32, 18	32, 31	32, 51	32, 84	32, 242	32, 229	32, 374	32, 593	32, 959
150 001 to 500 000	*n*, Ac	50, 18	50, 31	50, 51	50, 84	50, 141	50, 229	50, 374	50, 593	50, 959	50, 1 524
>500 000	*n*, Ac	80, 31	80, 51	80, 84	80, 143	80, 231	80, 374	80, 607	80, 959	80, 1548	80, 2 455

Table 4 — Table of sampling plans — LQ from 50 to 3 150, with correlation of nonconformities

Lot size		Limiting quality LQ in average number of nonconformities per 100 items (model with correlation of the nonconformities)									
		50	80	125	200	315	500	800	1 250	2 000	3 150
16 to 25	*n*, Ac	5, 0	4, 0	3, 0	2, 0	2, 1	2, 2	2, 3	2, 6	2, 10	2, 16
26 to 50	*n*, Ac	5, 0	5, 1	4, 1	3, 1	3, 2	3, 4	3, 8	3, 13	3, 18	2, 18
51 to 90	*n*, Ac	8, 1	6, 1	5, 2	5, 3	5, 6	5, 11	4, 13	3, 13	3, 18	2, 18
91 to 150	*n*, Ac	9, 1	8, 2	8, 4	8, 7	8, 13	6, 14	4, 14	3, 14	3, 18	2, 18
151 to 280	*n*, Ac	13, 2	13, 5	13, 9	13, 15	9, 15	6, 15	5, 17	4, 18	3, 18	2, 18
281 to 500	*n*, Ac	20, 5	20, 9	20, 15	13, 15	9, 15	7, 17	5, 18	4, 18	3, 21	3, 33
501 to 1 200	*n*, Ac	32, 10	32, 17	22, 17	14, 17	10, 17	7, 18	5, 18	5, 29	5, 47	5, 75
1 201 to 3 200	*n*, Ac	50, 17	32, 17	22, 17	15, 18	10, 18	8, 21	8, 35	8, 56	8, 91	8, 145
3 201 to 10 000	*n*, Ac	53, 18	34, 18	23, 18	15, 18	13, 25	13, 41	13, 67	13, 105	13, 170	13, 270
10 001 to 35 000	*n*, Ac	53, 18	34, 18	23, 18	20, 26	20, 43	20, 70	20, 113	20, 178	20, 287	20, 454
35 001 to 150 000	*n*, Ac	53, 18	34, 18	32, 28	32, 46	32, 75	32, 121	32, 196	32, 309	32, 496	32, 783
150 001 to 500 000	*n*, Ac	53, 18	50, 29	50, 47	50, 78	50, 125	50, 201	50, 325	50, 510	50, 819	50, 1 292
>500 000	*n*, Ac	80, 30	80, 50	80, 81	80, 132	80, 211	80, 338	80, 544	80, 854	80, 136 9	80, 2 160

4.2 Choice of limiting quality (LQ)

The purpose of this document is to guard against unsatisfactory quality. In this document, the limiting quality (LQ) is the parameter used to protect against unsatisfactory quality. The sampling plans in this document have a probability of accepting the lot at the LQ at approximately 10 %. In this document, the sampling tables are indexed by a set of specified limiting quality values. If the user's chosen LQ value is not among the specified ones, then an applicable LQ value can be found as the lower bound of the intervals provided in Tables 5 to 7, as the use of a higher standard LQ than the user specified LQ would lead to a probability of acceptance higher than 10 %. (See EXAMPLE 1.)

Table 5 — Ranges of LQ values, from 0,00 (lower) 0,05 (upper) to 0,8 (lower) 1,25 (upper)

Value type	Limiting quality (LQ) in percentage nonconforming or average number of nonconformities per 100 items							
Lower bound	0,00	0,05	0,08	0,125	0,2	0,315	0,5	0,8
Upper bound	0,05	0,08	0,125	0,2	0,315	0,5	0,8	1,25

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Table 6 — Ranges of LQ values, from 1,25 (lower) 2 (upper) to 31,5 (lower) 50 (upper)

Value type	Limiting quality (LQ) in percentage nonconforming or average number of nonconformities per 100 items							
Lower bound	1,25	2	3,15	5	8	12,5	20	31,5
Upper bound	2	3,15	5	8	12,5	20	31,5	50

Table 7 — Ranges of LQ values, from 50 (lower) 80 (upper) to 2 000 (lower) 3 150 (upper)

Value type	Limiting quality (LQ) in percentage nonconforming or average number of nonconformities per 100 items								
Lower bound	50	80	125	200	315	500	800	1 250	2 000
Upper bound	80	125	200	315	500	800	1 250	2 000	3 150

EXAMPLE 1

For a product, the limiting quality has been set at 3,5 percentage nonconforming (3,5 %). This is a nonspecified value and it shall be converted to the specified value of 3,15, since 3,5 lies in the interval of 3,15 < LQ < 5 in Table 6.

EXAMPLE 2

For a product, the limiting quality has been set at 12 nonconformities per 100 items. This a nonspecified value and it shall be converted to the specified value of 8, since 12 lies in the interval of 8 < LQ < 12,5 in Table 6.

4.3 Obtaining a sampling plan

A sampling plan is identified by:

a) the inspection context;

b) the lot size;

c) the limiting quality; and

d) the consumer´s risk.

The inspection context shall distinguish between:

1) inspection for nonconforming items; and

2) inspection for nonconformities.

In the case of inspection for nonconformities, distinguish between the cases where the lot is considered as a lot:

i) with correlation of the nonconformities (see 6.1); or

ii) without correlation of the nonconformities (see 6.2).

The applicable sample size *n* and acceptance number Ac shall be found in the appropriate table using the lot size, the specified limiting quality (LQ) and the consumer's risk (0,10).

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5 Acceptance and non-acceptance

5.1 Drawing of samples

The items selected for the sample shall be drawn from the lot by simple random sampling. When the lot consists of sub-lots or strata, identified by some rational criterion, stratified sampling shall be used in such a way that the number of items sampled is proportional to the number of items in the sub-lot or stratum.

5.2 Acceptance of lots

All items in the sample shall be inspected and the number of nonconforming items (or the total number of nonconformities) shall be counted.

Acceptability of a lot shall be determined by the use of the obtained sampling plan. If the number of nonconforming items (or the total number of nonconformities) found in the sample is less than or equal to the acceptance number Ac, the lot shall be accepted, otherwise the lot shall not be accepted.

5.3 Disposition of non-accepted lots

The disposition of lots not accepted shall be agreed in advance by all interested parties.

5.4 Accepted lots with one or more nonconforming units or nonconformities

If a lot has been accepted, the right is reserved not to accept any item found nonconforming or having nonconformities during the acceptance sampling inspection that led to lot acceptance.

5.5 Resubmitted lots

A lot that has been inspected but not accepted shall only be resubmitted for re-inspection if:

a) the purchaser is satisfied that the number of nonconforming items or the total number of nonconformities is sufficiently low, e.g., by reworking; and

b) all interested parties agree.

The responsible authority shall determine the method of re-inspection to be applied (i.e. the LQ and the associated consumer's risk) and whether re-inspection shall include all types or classes of nonconformities or only those that caused the initial non-acceptance.

6 Sampling for nonconformities

This document is also applicable for sampling for nonconformities, which will be distinguished depending on the respective dispersion structure.

6.1 Sampling for nonconformities for lots with correlation of the nonconformities

Nonconformities tend to cluster on particular items. This means:

— the occurrence of a nonconformity on an item increases the likelihood of finding further nonconformities on that item;

— the total number of nonconformities in a lot is rather unevenly distributed over the items in the lots (see example in 7.2).

For further information on the sampling distribution, see Annex A.

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6.2 Sampling for nonconformities for lots without correlation of the nonconformities

Nonconformities do not cluster on particular items. This means:

— the number of nonconformities on individual items in the lot deviates from the mean number p of nonconformities per item in the lot with an average square deviation of the order of magnitude of p or smaller;

— the total number of nonconformities in a lot is rather evenly distributed over the items in the lot (see example in 7.3).

For further information on the sampling distribution, see Annex A.

6.3 General advice on sampling for nonconformities

Different from sampling for nonconforming items, there is not a unique distribution model for sampling for nonconformities. Neither of the two competing models can claim exclusive validity. The f-binomial noncorrelation model leads to lower sample size and higher acceptance numbers than the negative hypergeometric correlation model. To protect against the worst case, it is recommended to the user to consider the correlation model, as long as there is no sufficient evidence to support the noncorrelation assumption.

7 Examples

7.1 Example of sampling for nonconforming items

A consumer wishes to purchase packages of 10 screws to include in the self-assembly bookcase kits. He/she plans to produce 5 000 kits in lots of 1 250. While he/she prefers each package to contain exactly 10 screws, he/she can tolerate a few packages with fewer screws, but does not want to risk accepting a high percentage of nonconforming packages.

The supplier agrees to use this document with preferred value of limiting quality 3,15 (in percentage nonconforming). For lot size 1 250, the selected sampling plan is n = 125, Ac = 1. (See Tables 1 to 4.)

The supplier offers to provide the packs needed for all 5 000 kits as a single lot. The new sampling plan is n = 200, Ac = 3. (See Tables 1 to 4.)

By Tables 8 and 9, the consumer incurs a consumer´s risk (CR) of 0,085 7 at the LQ of 0,031 5 for lot size N = 1 250, whereas he/she incurs a CR of 0,119 9 for lot size N = 5 000 at the same LQ.

Furthermore, Tables 8 and 9 provide the respective producer´s risk quality (PRQ) and producer´s risk (PR). While at the LQ of 3,15 (in percentage nonconforming) and for lot size N = 1 250, the PRQ is 0,003 13 (0,313 %) with a PR of 0,05, at the same LQ and for lot size N = 5 000, the PRQ amounts to 0,007 0 (0,7 %) with a PR of 0,05, too. That is, a feasible lot proportion nonconforming less or equal to 0,003 1 and 0,007, respectively, is rejected with a maximum probability of 5 %.

7.2 Example of sampling for nonconformities for lots with correlation

An auditor inspects the supplier accounts of a medium size retailer of steel products. The retailer has 125 suppliers and each supplier account contains a large number of journal entries. The auditor assumes the tolerable misstatement in average number of nonconformities per item is 0,05, i.e., on the average each account should have at most 5 misstated journal entries, i.e., the average number of nonconformities per item is 0,05. Auditing proceeds by sampling inspection according to this document with limiting quality 5 (in nonconformities per 100 items).

For lot size N = 125, Tables 1 to 4 prescribe the sampling plan with sample size n = 38 and acceptance number Ac = 0. From previous auditing experience, the auditor knows that the auditee's accounting system tends to generate correlated errors, i.e., the error numbers of the individual account entries *vary strongly* around their average. Thus, by Tables 13 to 15, the auditor incurs a consumer's risk of 0,115 01

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at the LQ 5 (in nonconformities per 100 items). Furthermore, Tables 13 to 15 provide a producer´s risk quality (PRQ) of 0,000 00 (0 %) and a producer´s risk (PR) of 0,000 00, i.e., by the occurrence of one single nonconformity in the lot the PR bound of 0,05 probability of acceptance would already be exceeded.

7.3 Example of sampling for nonconformities for lots without correlation

This is the same situation as in the example in 7.2 but without correlation. An auditor inspects the supplier accounts of a medium size retailer of steel products. The retailer has 125 suppliers and each supplier account contains a large number of journal entries. The auditor assumes p = 5 as the rate of tolerable misstatement, i.e., on the average each account should have at most 5 misstated journal entries. Auditing proceeds by sampling inspection according to this document with limiting quality 5 (in nonconformities per 100 items).

For lot size N = 125, Tables 1 to 4 prescribe the sampling plan with sample size n = 38 and acceptance number Ac = 0. From previous auditing experience, the auditor knows that the auditee's accounting system tends to generate noncorrelated errors, i.e., the error numbers of the individual account entries *vary slightly* around their average. Thus, by Tables 10 to 12, the auditor incurs a consumer's risk of 0,109 0 at the LQ of 5 (in nonconformities per 100 items). Furthermore, Tables 10 to 12 provide a producer´s risk quality (PRQ) of 0,000 0 (0 %) and a producer´s risk (PR) of 0,000 0. I.e., by the occurrence of one single nonconformity in the lot, the PR bound of 0,05 probability of acceptance would already be exceeded.

8 Additional information about the tables

8.1 Tables 8 to 15

Tables 8 to 15 are all named as "Consumer´s risk and producer´s risk quality for sampling plans". The difference is between the underlying distributions.

Tables 8 and 9 address CR and PRQ for sampling plans for nonconforming units.

Tables 10 to 12 address CR and PRQ for sampling plans for nonconformities under the model without correlation of the nonconformities.

Tables 13 to 15 address CR and PRQ for sampling plans for nonconformities under the model with correlation of the nonconformities.

The cell entries in the Tables 8 to 15 display:

a) upper line: sampling plan (n, Ac)

b) second line: representative CR´s (one or two values)

c) third line, left: PRQ

d) third line, right: PR

NOTE The representative CR´s and PR are expressed as a probability, whereas the PRQ is expressed as proportion nonconforming or average number of nonconformities per item.

8.2 Tables 16 and 17

Tables 16 and 17 give the shortest length confidence intervals for lot quality p (lot proportion nonconforming or average number of nonconformities per item in the lot), under confidence levels 0,95 and 0,99 for each sampling plan (n, Ac) for x = 0, … , Ac + 1, where x denotes the number of nonconforming units found in the sample or the number of nonconformities counted in the sample.

Since Ac is the acceptance number, x = 0,…, Ac covers all situations which lead to acceptance, whereas x = Ac + 1 is the first case leading to rejection.

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(For further information on technical background of confidence intervals, see Annex C.)

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Table 8 — Consumer's risk and producer's risk quality for sampling plans under hypergeometric sampling distribution, used for sampling for nonconforming units — LQ from 0,05 to 0,8

Lot size	Limiting quality (LQ) in percentage nonconforming						
	0,05	**0,08**	**0,125**	**0,2**	**0,315**	**0,5**	**0,8**
16 to 25	100 % inspection	100 % inspection	100 % inspection	100 % inspection	100 % inspection	100 % inspection	100 % inspection
26 to 50	100 % inspection	100 % inspection	100 % inspection	100 % inspection	100 % inspection	100 % inspection	100 % inspection
51 to 90	100 % inspection	100 % inspection	100 % inspection	100 % inspection	100 % inspection	100 % inspection	100 % inspection
91 to 150	100 % inspection	100 % inspection	100 % inspection	100 % inspection	100 % inspection	100 % inspection	100 % inspection
151 to 280	100 % inspection	100 % inspection	100 % inspection	(252, 0) 0,000 0 0,100 0 0,000 0 0,000 0	(252, 0) 0,000 0 0,100 0 0,000 0 0,000 0	(200, 0) 0,0000 0,000 0 0,0000	(170, 0) 0,101 5 0,000 0 0,000 0
281 to 500	100 % inspection	100 % inspection	(450, 0) 0,000 0 0,1000 0,000 0 0,0000	(450, 0) 0,100 0 0,000 0 0,000 0	(287, 0) 0,097 5 0,094 6 0,000 0 0,000 0	(280, 0) 0,089 5 0,000 0 0,000 0	(220, 0) 0,097 4 0,000 0 0,000 0
501 to 1 200	(1 080, 0) 0,000 0 0,100 0 0,000 0 0,000 0	(1 080, 0) 0,000 0 0,100 0 0,000 0 0,000 0	(720, 0) 0,100 0 0,000 0 0,000 0	(684, 0) 0,099 6 0,000 0 0,000 0	(510, 0) 0,038 5 0,099 7 0,000 0 0,000 0	(380, 0) 0,101 2 0,000 0 0,000 0	(255, 0) 0,098 0 0,000 0 0,000 0
1 201 to 3 200	(1 800, 0) 0,100 0 0,000 0 0,000 0	(1 710, 0) 0,099 8 0,000 0 0,000 0	(1 400, 0) 0,100 0 0,000 0 0,0000	(956, 0) 0,099 0 0,000 0 0,000 0	(653, 0) 0,099 6 0,096 4 0,000 0 0,000 0	(430, 0) 0,098 8 0,000 0 0,000 0	(280, 0) 0,094 8 0,000 0 0,000 0
3 201 to 10 000	(3 690, 0) 0,100 0 0,000 0 0,000 0	(2 501, 0) 0,099 9 0,000 0 0,000 0	(1 676, 0) 0,099 9 0,000 0 0,000 0	(1 087, 0) 0,099 9 0,000 0 0,000 0	(699, 0) 0,099 8 0,098 9 0,000 0 0,000 0	(450, 0) 0,099 5 0,000 1 0,050 0	(315, 0) 0,076 5 0,000 2 0,050 0
10 001 to 35 000	(4 306, 0) 0,100 0 0,000 0 0,000 0	(2 762, 0) 0,100 0 0,000 0 0,000 0	(1 793, 0) 0,099 9 0,000 0 0,000 0	(1 132, 0) 0,099 9 0,000 0 0,032 3	(717, 0) 0,099 9 0,000 0 0,000 0	(500, 0) 0,080 1 0,000 1 0,050 0	(500, 1) 0,089 1 0,000 7 0,050 0

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