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"Step Out From the Old to the New"

IS 2500-3 (1995): Sampling Inspection Procedures, Part 3:
Attribute Sampling Plans Indexed by Limiting Quality (LQ)
for Isolated Lot Inspection [MSD 3: Statistical Methods for
Quality and Reliability]

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Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 2500 (Part 3) : 1995
ISO 2859-2 : 1985

भारतीय मानक

नमूने लेने की निरीक्षण कार्यविधियाँ

भाग 3 विलगित राशि के निरीक्षण के लिये सीमित गुणता (एल क्यू)
द्वारा सूचित गुण-दोष मालूम करने के लिये नमूने लेने की योजना

Indian Standard

SAMPLING INSPECTION PROCEDURES

PART 3   ATTRIBUTE SAMPLING PLANS INDEXED BY LIMITING QUALITY (LQ) FOR
ISOLATED LOT INSPECTION

[ISO Title : Sampling procedures for inspection by attributes — Part 2 : Sampling

plans indexed by limiting quality (LQ) for isolated lot inspection]

(First Reprint JULY 1997)

ICS No. 03.120.10

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

NATIONAL FOREWORD

This Indian Standard which is identical with ISO 2859-2 : 1985 'Sampling procedures for inspection by attributes — Part 2 : Sampling plans indexed by limiting quality (LQ) for isolated lot inspection', issued by the International Organization for Standardization (ISO), was adopted by the Bureau of Indian Standards on the recommendation of the Statistical Methods for Quality and Reliability Sectional Committee (MSD 3), and approval of the Management and Systems Division Council.

This standard (Part 3) is third in the series of Sampling Inspection Procedures. The other published parts are as follows:

Part 1   Attribute sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection

Part 2   Inspection by variables for percent defective

The text of ISO 2859-2 : 1985 has been approved as suitable for publication as Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a)   Wherever the words 'this part of ISO 2859' appear referring to this standard, they should be read as 'this part of IS 2500'.

b)   Comma (,) has been used as decimal marker while in Indian Standards the current practice is to use a point (.) as the decimal marker.

In the adopted standard, informative reference appears to ISO 2859/1 'Sampling procedures for inspection by attributes –– Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection' which has been adopted in *toto* as IS 2500 (Part 1) : 1992 'Sampling inspection procedures: Part 1 Attribute sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection'.

Indian Standard

SAMPLING INSPECTION PROCEDURES

PART 3 ATTRIBUTE SAMPLING PLANS INDEXED BY LIMITING QUALITY (LQ) FOR ISOLATED LOT INSPECTION

0 Introduction

0.1 General

ISO 2859 comprises four parts:

Part 0: General introduction.

Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection.

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

Part 3: Skip lot sampling plan.

ISO 2859/1 sampling plans, indexed in terms of AQL, which is defined as a process average, were primarily designed for the assessment of a continuing series of lots. This enables switching rules to be employed which not only give protection to the consumer (by the switch to tightened inspection and discontinuation where necessary) but also provide an incentive to the producer (by the switch to reduced inspection) with a reduction to test and inspection costs (when consistently good quality is achieved). However, there is little doubt that in many industrial situations today the switching rules are not applied for a variety of reasons or excuses, not all of which may be valid:

a) individual ISO 2859/1 plans are used alone but "AQL" protection is still claimed or AQL re-defined, to suit "so-called unique products";

b) "our industry... product is special so ISO 2859/1 standard plans need not apply to us";

c) production is intermittent (not continuous);

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

e) purchases are from stock-holders — no source data available;

f) lots are "small" (use of hypergeometric distribution required);

g) lots are "isolated";

h) lots are re-submitted after initial rejection.

Consequently, in certain of the above cases consumer protection may need to be attained or measured by other methods. This part of ISO 2859 uses the limiting quality to measure consumer protection. It should be remembered, however, that prior information on the supplier's quality assurance system and its effectiveness may play a major part in deciding whether or not to accept a single lot.

0.2 Objectives

In an attempt to reconcile the somewhat diverse requests for assistance made over the past few years by committees of international standardizing bodies representing various product sectors, this part of ISO 2859 was drawn up in accordance with the following principles:

a) the new LQ plans can be easily integrated with the existing AQL plans in ISO 2859/1;

b) the LQ indexing uses a preferred series of values that cannot be confused with the preferred series of AQL values;

c) the five basic numbers associated with a single sampling plan, i.e. lot size, sample size, acceptance number, AQL (or quality accepted with probability 0,95) and LQ, appear in the same table, whenever possible.

0.3 Summary

The problems associated with acceptance sampling inspection involve defining unambiguously the criteria used to judge discrete individual items supplied in quantity, the quality level expected from the manufacturing process, the discrimination offered by the plans and the procedure to be followed when a lot is not accepted. Above all, however, it is necessary to design the sampling scheme so that it may easily be invoked in a purchasing contract. The plans in this part of ISO 2859 make maximum use of the established plans given in ISO 2859/1, so that sub-clause 12.6 of ISO 2859/1 (see 1.1) can be made directly operational, by providing a rationalized series of plans indexed in terms of limiting quality (LQ).

1 Scope and field of application

1.1 Scope

This part of ISO 2859 establishes LQ sampling plans and procedures for inspection by attributes compatible with ISO 2859/1 that can be used when the switching rules given in ISO 2859/1are not applied, for example, when lots are of an isolated nature.

The plans in this part of ISO 2859 are indexed by a preferred series of limiting qualities (LQ) with a consumer's risk usually below 10 %, but always below 13 %. This method of indexing permits the "ad-hoc" procedure[1] mentioned in sub-clause 12.6 of ISO 2859/1 to be implemented as a standard procedure.

NOTE — The plans in ISO 2859/1 are indexed by a preferred series of AQL values and inspection levels. During the inspection of a continuing series of lots the application of switching rules helps to ensure that the process average in that series of lots is kept below the specified AQL. Limiting quality does not have the same direct relationship with the process average (see 3.5.1).

1.2 Field of application

Alternative procedures are provided in this part of ISO 2859 to cater for two situations often met in practice:

a) **Procedure A**, to be used when the supplier and consumer both wish to regard the lot in isolation. The tables are based on random sampling from finite lots for both consumer and producer risks. This procedure shall be used unless there is a specific instruction to use procedure B.

b) **Procedure B**, to be used when the supplier regards the lot as one of continuing series but the consumer considers the lot received in isolation. The tables are based on random sampling from a finite lot for consumer's risk at the limiting quality, but random sampling from a process for the producer's risk and the tabulated values of the operating characteristic (OC) curves. The plans used are a selection of the plans available in ISO 2859/1 so that a producer can maintain consistent procedures for customers whether or not they receive individual lots or a continuing series of lots. This procedure is suitable for inclusion in product standards or specifications that contain sampling clauses. The manufacturer will be concerned with all of his production, but the individual consumer only with the particular lot received.

2 Definitions

The definitions given in ISO 2859/1 shall apply.

3 Choice of sampling plan

3.1 Specifying a sampling plan

When reference is made to this part of ISO 2859 in a contract or specification, it is necessary to specify the procedure to be used (i.e. either A or B). In the absence of any reference to either procedure, then procedure A shall be used.

3.2 Choice of sampling procedure

Although procedure A is based on the hypergeometric distribution for sampling results, this distribution is well approximated by the binomial distribution for plans with non-zero acceptance numbers in procedure A. Hence the OC curves for these plans are well approximated by the tabulated performance of the same plans in procedure B. However, procedure A uses plans with acceptance number zero and with sample sizes based on the hypergeometric distribution of sampling results while procedure B excludes accept zero plans, replacing them with 100 % inspection.

The choice between the procedures is dominated by the attitude towards accept zero plans. Procedure A uses accept zero plans linking the sample size and the lot size by the hypergeometric distribution until the proposed plan corresponds to the accept zero plan in ISO 2859/1 corresponding to that limiting quality. Thereafter the progression of sampling size and acceptance number with lot size is based on the inspection levels available in ISO 2859/1. The overall effect of procedure A resembles inspection level II for limiting quality less than 8 % and level I for limiting quality greater than 8 % with 8 % being intermediate between these levels.

Procedure B provides greater flexibility in the choice of inspection levels. The tabulated OC curves are based on the probability of producing a nonconforming unit so they are approximately correct for small sampling fractions but as the sampling fraction increases the curves (and tables) underestimate the probability of acceptance for good quality and underestimate the probability of rejection for poor quality. For sufficiently small lots, procedure B requires 100 % inspection.

Both procedures treat the limiting quality (LQ) as the actual percent nonconforming units in the submitted lots and the probability of acceptance at this limiting quality can be found in table D1 for procedure A and tables B1 to B10 for procedure B. Procedure B is indicated as the appropriate procedure if the manufacturer is concerned with a continuing series of lots; whether or not these go to the same consumer. Procedure A is indicated as the appropriate procedure when the lot is a single lot and shall be used if accept zero plans are required to be part of the sampling scheme.

3.3 Procedure A (use table A)

A plan is identified by the lot size and the limiting quality (LQ).

With the specified lot size and limiting quality as indexing values, the sampling size (n) and acceptance number (Ac) are given in table A.

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1) ISO 2859/1 sub-clause 12.6.2, states: "If the lot or batch is of an isolated nature, it may be desirable to limit the selection of sampling plans to those, associated with a designated AQL value, that provide not less than a specified limiting quality protection. Sampling plans for this purpose can be selected by choosing a limiting quality (LQ) and a consumer's risk to be associated with it. Tables 6 and 7 give process levels for which the probabilities of lot acceptance under various sampling plans are 10 % and 5 %, respectively." This part of ISO 2859 establishes preferred values for the LQ and allows the consumer's risk to vary as indicated above.

Although the primary index to these tables 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. Information on the producer's risk point is contained in table D1. Information on the probability of acceptance of relatively good lots by accept zero plans is given in table D2.

3.4 Procedure B (use tables B)

A plan is identified by the lot size, limiting quality (LQ) and the inspection level (unless otherwise specified, level II shall be used).

The specified limiting quality is used to select the appropriate table from tables B1 to B10. Within each table the specified lot size and inspection level indicate the appropriate sample size (n) and acceptance number (Ac). Although the primary index to the table 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. Each table gives information on the equivalent AQL and details of the OC curves. The OC curves are indexed by the sample size code letter used in ISO 2859/1 and the acceptance number.

The OC curves given under tables B1 to B10 are based on the Poisson/binomial distribution; the actual operating characteristic will be more discriminating than these curves by accepting with greater probability when the indicated probability is $\geqslant$ 0,90 and with a smaller probability when the indicated probability is < 0,10.

3.5 Choice of parameters for the sampling procedures

3.5.1 Limiting quality (LQ)

Unlike the AQL, which provides a guide for the producer on the level or quality he needs to produce so that he can satisfy the acceptance criteria (sampling clause) most of the time, the limiting quality does not provide a reliable guide for the consumer as to the true quality of the accepted lots. For this reason the limiting quality should be chosen realistically at a minimum of three times the desired quality.

This enables the producer/supplier to provide lots of the desired quality and still have a reasonable probability of acceptance for the submitted lots, at least for acceptance numbers 3, 5, 10 and 18. For acceptance number 1 plans the lots have to have a quality better than LQ_{10} and for acceptance number zero plans the lots have to be perfect or nearly perfect before the probability of acceptance rises to 0,95 or greater. The limiting values are restricted to a set of preferred values and the plans are intended to be used with these preferred values. If these plans are introduced where a non-standard limiting quality is already specified, the plans should be entered with the preferred value (LQ) corresponding to the interval containing the non-standard value (L) listed in column 4 of table C. Columns 2 and 3 of table C contain information on the consumer's risk qualities (CRQ) found in tables B1 to B10 for consumer's risks of 10 % and 5 %.

Example:

The limiting quality has previously been set at 3,5 %. This is not a preferred value and the tables shall be entered by using the nominal limiting quality LQ = 3,15 % since 3,5 % lies in the range 2,5 % < LQ < 4,0 %.

3.5.2 Inspection level

In the ISO 2859/1 procedures, increased sample size corresponds to a greater protection for the consumer. In this part of ISO 2859, consumer protection is held approximately constant and the effect of increasing sample size is to permit the supplier greater latitude in the permitted process averages. If the consumer is satisfied by the protection provided against an occasional poor lot by the nominal limiting quality, then the inspection level is primarily of interest to the supplier, especially if the costs of the sampling inspection are borne by him. A process average well below the limiting quality (better quality) would allow the use of smaller sample sizes. Conversely, if the consumer is concerned with actual rather than limiting quality, or if he pays for the sampling costs, then greater inspection levels are not necessarily advantageous. For this reason, inspection level III provided by ISO 2859/1 has not been incorporated in this part of ISO 2859 for limiting qualities greater than 5 %. When sample sizes have to be kept small and other considerations are secondary, specifying level S-2 has the effect of providing a fixed sample size for all lot sizes, the sample size depending only on the limiting quality.

4 Rules for acceptance and non-acceptance

4.1 Sampling

Once the sampling plan has been determined as in clause 3, the specified sample units shall now be drawn at random from the lot, and all units in the sample inspected.

4.2 Acceptance

If the number of nonconforming units, or the total number of nonconformities, found in the sample is equal to or less than the acceptance number (Ac) specified in the plan, the lot shall be accepted.

4.3 Nonconforming units

Notwithstanding that the lot is accepted, any nonconforming units found during inspection, whether forming part of the sample or not, shall be rejected.

4.4 Non-acceptance and resubmission

If the number of nonconforming units found in the sample is greater than the acceptance number (Ac), the lot is unacceptable. An unacceptable lot may not be resubmitted for inspection unless

a) the Responsible Authority agrees, and

b) all units in the lot have been re-examined or retested and all nonconforming units have been removed or replaced by good units or nonconformities have been corrected.

If the Responsible Authority agrees to the resubmission of an unacceptable lot, he shall determine the method of acceptance inspection to be applied (i.e. LQ and/or inspection level) and whether re-inspection shall include all types or classes of non-conformities or only those that caused the initial rejection.

5 Double and multiple sampling plans

Tables D3 and D4 provide the sample sizes and acceptance patterns for the double and multiple sampling plans in ISO 2859/1 equivalent to the single sampling plans given in tables B1 to B10. The sample size code agrees with that in ISO 2859/1 and the acceptance pattern code is the acceptance number in the corresponding single size plans. Since procedure A and procedure B plans have similar OC curves for non-zero acceptance numbers, these double and multiple plans can also be used in procedure A to replace the corresponding single sampling plan. The user is referred to 11.1.2 and 11.1.3 in ISO 2859/1 for the operation of these double and multiple sampling plans.

6 Examples illustrating how to use this part of ISO 2859

6.1 A consumer wishes to purchase prepacked sets of 10 screws to include in the self-assembly bookcase kits he plans to sell. While he prefers each set to contain exactly 10 screws, he can tolerate 1 % of packs with fewer screws but he does not want to risk accepting a much higher percentage of deficient packs. He plans to produce 5 000 kits in lots of 1 250.

The supplier agrees to use procedure A with nominal limiting quality 3,15 %. For lots of size 1 250, the selected plan has $n = 125$, Ac $= 1$.

The supplier offers to provide the packs needed for all 5 000 kits as a single lot. The new sampling plan has $n = 200$, Ac $= 3$.

The single lot requires proportionately fewer tested items and yet the sampling plan still provides a high probability of rejection for quality as poor as 3,15 %, while increasing the probability of acceptance for a lot of quality 1 % from 0,64 to 0,86.

6.2 The same consumer wishes to purchase the wooden components of his self-assembly bookcase kit as standard-size, plastic-faced chipboard panels. The supplier produces these panels as part of his regular production and regards the 7 500 panels needed for each lot of 1 250 kits as single lots in the general stream of supply to DIY shops. Scars to the plastic facing occur with probability 0,025 according to quality control checks. The consumer can tolerate some scarred panels since these can be detected and set aside during the processing to

produce the bookcase kit, but he decides that if 5 % of the panels were scarred this would present problems during the processing.

The consumer and supplier agree that procedure B is appropriate and select nominal limiting quality 5,0 % with inspection level S-4. The parameters of the sampling plan for a lot size of 7 500 is $n = 80$, Ac $= 1$. With this plan the probability of acceptance with the current process average is less than 0,5. A lot which is unacceptable has to be 100 % inspected before use and this high probability of non-acceptance implies inspection costs larger than desirable.

Inspection level III would have provided a sampling plan with $n = 315$ and Ac $= 10$. The current process average would produce lots with a probability of acceptance greater than 0,80. A supplier with a better process average, say 1 %, would obtain a similar probability of acceptance with inspection level S-4. This illustrates the ability of better suppliers to work with smaller sample sizes whilst still meeting the same limiting quality criterion.

7 Compatibility with ISO 2859/1

7.1 General

Within the probability constraints inherent in attribute sampling, the LQ indexed plans standardized in table A and tables B provide a rationalized selection from the existing AQL indexed plans of ISO 2859/1. Similar rules for acceptance and non-acceptance and the ISO 2859/1 lot size categories have also been retained for compatibility. Significant deviations are given in 7.2 and 7.3.

7.2 Procedure A (see table A)

For unique lots with a relatively high sample size/lot size ratio, it becomes necessary to use the hypergeometric distribution. Consequently, there are an additional 39 (Ac = 0) plans in table A for which operating characteristic (OC) curve data is given in table D2. The remaining 80 plans of table A have been taken from ISO 2859/1.

7.3 Procedure B (see tables B)

All the plans in tables B have been selected from ISO 2859/1 by using a sliding scale for the consumer's risk (usually below 10 %) at the specified limiting quality (LQ). ISO 2859/1 inspection levels are also included (see 3.5.2) but Ac = 0 plans have not been included in tables B, as table A can be used, if Ac = 0 plans are considered essential.

Table A — Single sampling plans indexed by limiting quality (LQ) (Procedure A)

Lot size		0,5	0,8	1,25	2,0	3,15	5,0	8,0	12,5	20	32
		Limiting quality in percent (LQ)									
16 to 25	n	→	→	→	→	→	25[1]	17[1]	13	9	6
	Ac						0	0	0	0	0
26 to 50	n	→	→	→	50[1]	50[1]	28[1]	22	15	10	6
	Ac				0	0	0	0	0	0	0
51 to 90	n	→	→	90[1]	50	44	34	24	16	10	8
	Ac			0	0	0	0	0	0	0	0
91 to 150	n	→	150[1]	90	80	55	38	26	18	13	13
	Ac		0	0	0	0	0	0	0	0	1
151 to 280	n	200[1]	170[1]	130	95	65	42	28	20	20	13
	Ac	0	0	0	0	0	0	0	0	1	1
281 to 500	n	280	220	155	105	80	50	32	32	20	20
	Ac	0	0	0	0	0	0	0	1	1	3
501 to 1 200	n	380	255	170	125	125	80	50	32	32	32
	Ac	0	0	0	0	1	1	1	1	3	5
1 201 to 3 200	n	430	280	200	200	125	125	80	50	50	50
	Ac	0	0	0	1	1	3	3	3	5	10
3 201 to 10 000	n	450	315	315	200	200	200	125	80	80	80
	Ac	0	0	1	1	3	5	5	5	10	18
10 001 to 35 000	n	500	500	315	315	315	315	200	125	125	80
	Ac	0	1	1	3	5	10	10	10	18	18
35 001 to 150 000	n	800	500	500	500	500	500	315	200	125	80
	Ac	1	1	3	5	10	18	18	18	18	18
150 001 to 500 000	n	800	800	800	800	800	500	315	200	125	80
	Ac	1	3	5	10	18	18	18	18	18	18
> 500 000	n	1 250	1 250	1 250	1 250	800	500	315	200	125	80
	Ac	3	5	10	18	18	18	18	18	18	18

1) When n exceeds the lot size, use 100 % inspection with zero acceptance number.

→ Limiting quality implies less than one nonconforming item in the lot. Use first available plan for higher LQ.

Table B1 — Sampling plans for limiting quality 0,5 %

Lot sizes for inspection levels					ISO 2859/1 Single sampling plan (Normal inspection)			Code letter	Tabulated values of submitted quality accepted with designated probabilities[1] (quality as percent nonconforming)					Acceptance probabilities for limiting quality[2]	
S-1 to S-3	S-4	I	II	III	AQL	n	Ac		0,95	0,90	0,50	0,10	0,05	max.	min.
> 800[3]	> 800[3]	> 800[3]	801[3] to 500 000	801[3] to 150 000	0,065	800	1	P	0,044 4	0,066 5	0,210	0,486	0,593	0,091	0,000
			> 500 000	150 001 to 500 000	0,10	1 250	3	Q	0,109	0,140	0,294	0,534	0,620	0,129	0,129
				> 500 000	0,10	2 000	5	R	0,131	0,158	0,284	0,464	0,526	0,066	0,066

1) Probability calculated by the Poisson approximation.

2) The exact acceptance probabilities calculated from the hypergeometric distribution vary with lot size, the maximum and minimum values attained for permitted lot sizes are given for each plan.

3) For fewer than 801 in the lot, 100 % inspect the lot.

Operating characteristic curves for single sampling plans

(Curves are identified by sample size code)

Quality of submitted lots (percent nonconforming)

Lot sizes for inspection levels					ISO 2859/1 Single sampling plan (Normal inspection)			Code letter	Tabulated values of submitted quality accepted with designated probabilities [1] (quality as percent nonconforming)					Acceptance probabilities for limiting quality [2]	
S-1 to S-3	S-4	I	II	III	AQL	n	Ac		0,95	0,90	0,50	0,10	0,05	max.	min.
> 500 [3]	> 500 [3]	501 [3] to 500 000	501 [3] to 150 000	501 [3] to 35 000	0 1	500	1	N	0,071	0,106	0,336	0,778	0,949	0,091	0,000
		> 500 000	150 001 to 500 000	35 001 to 150 000	0,15	800	3	P	0,171	0,218	0,459	0,835	0,969	0,118	0,115
			> 500 000	> 150 000	0,15	1 250	5	Q	0,209	0,252	0,454	0,742	0,841	0,066	0,066

1) Probability calculated by the Poisson approximation.

2) The exact acceptance probabilities calculated from the hypergeometric distribution vary with lot size, the maximum and minimum values attained for permitted lot sizes are given for each plan.

3) For fewer than 501 in the lot, 100 % inspect the lot.

Operating characteristic curves for single sampling plans

(Curves are identified by sample size code)

Quality of submitted lots (percent nonconforming)
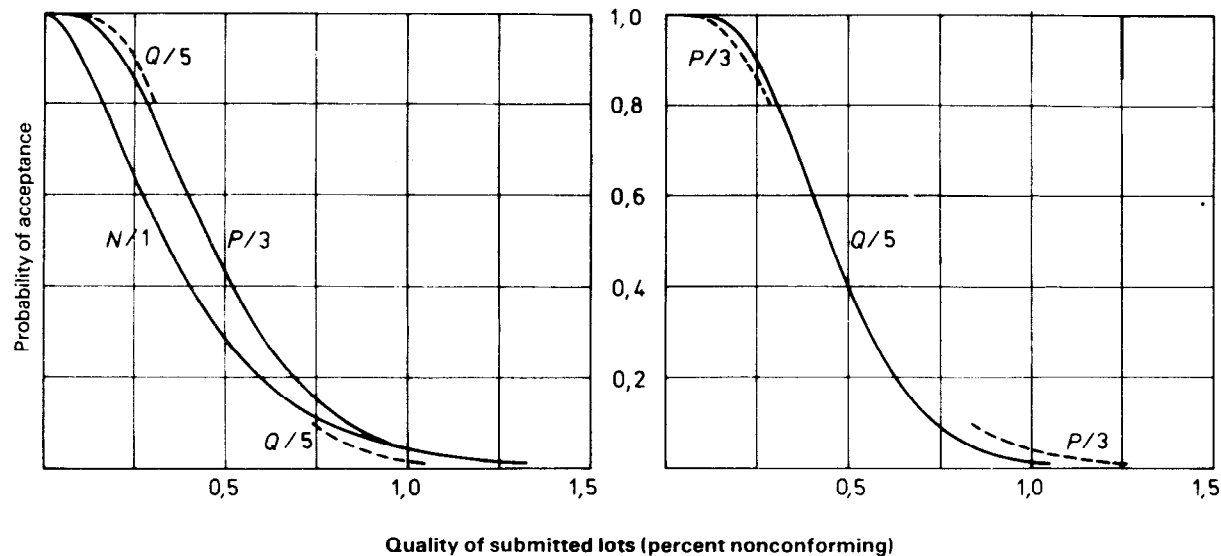
Table B3 — Single sampling plans for limiting quality 1,25 %

Lot sizes for inspection levels					ISO 2859/1 Single sampling plan (Normal inspection)			Code letter	Tabulated values of submitted quality accepted with designated probabilities[1] (quality as percent nonconforming)					Acceptance probabilities for limiting quality[2]	
S-1 to S-3	S-4	I	II	III	AQL	n	Ac		0,95	0,90	0,50	0,10	0,05	max.	min.
>315[3]	>315[3]	316[3] to 500 000	316[3] to 35 000	316[3] to 10 000	0,15	315	1	M	0,112	0,168	0,532	1,23	1,51	0,095	0,000
		>500 000	35 001 to 150 000	10 001 to 35 000	0,25	500	3	N	0,273	0,349	0,734	1,34	1,55	0,129	0,122
			150 001 to 500 000	35 001 to 150 000	0,25	800	5	P	0,327	0,394	0,709	1,16	1,31	0,066	0,064
			> 500 000	> 150 000	0,40	1 250	10	Q	0,494	0,562	0,853	1,23	1,36	0,089	0,089

1) Probability calculated by the Poisson approximation.

2) The exact acceptance probabilities calculated from the hypergeometric distribution vary with lot size, the maximum and minimum values attained for permitted lot sizes are given for each plan.

3) For fewer than 316 in the lot, 100 % inspect the lot.

Operating characteristic curves for single sampling plans

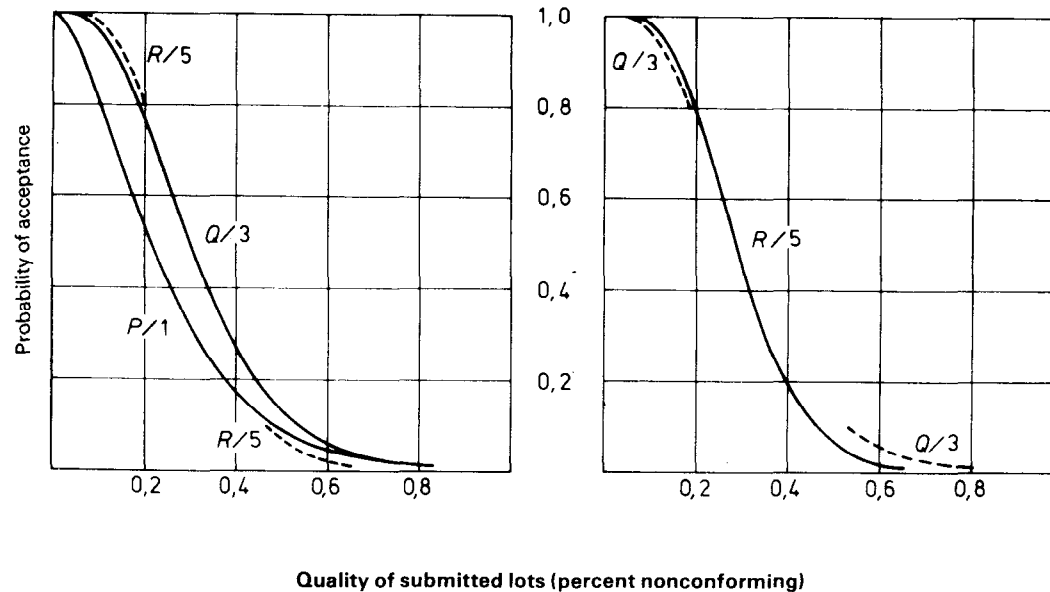(Curves are identified by sample size code)

Quality of submitted lots (percent nonconforming)

Table B4 — Single sampling plans for limiting quality 2,00 %

Lot sizes for inspection levels					ISO 2859/1 Single sampling plan (Normal inspection)			Code letter	Tabulated values of submitted quality accepted with designated probabilities[1] (quality as percent nonconforming)					Acceptance probabilities for limiting quality[2]	
S-1 to S-3	S-4	I	II	III	AQL	n	Ac		0,95	0,90	0,50	0,10	0,05	max.	min.
> 200[3]	> 200[3]	201[3] to 150 000	201[3] to 10 000	201[3] to 3 200	0,25	200	1	L	0,178	0,266	0,839	1,95	2,37	0,089	0,000
		150 001 to 500 000	10 001 to 35 000	3 201 to 10 000	0,40	315	3	M	0,433	0,533	1,17	2,12	2,46	0,124	0,111
		> 500 000	35 001 to 150 000	10 001 to 35 000	0,40	500	5	N	0,523	0,630	1,13	1,86	2,10	0,065	0,061
			> 150 000	> 35 000	0,65	800	10	P	0,771	0,878	1,33	1,93	2,12	0,075	0,073

1) Probability calculated by the Poisson approximation.

2) The exact acceptance probabilities calculated from the hypergeometric distribution vary with lot size, the maximum and minimum values attained for permitted lot sizes are given for each plan.

3) For fewer than 201 in the lot, 100 % inspect the lot.

9

Operating characteristic curves for single sampling plans

(Curves are identified by sample size code)

Quality of submitted lots (percent nonconforming)
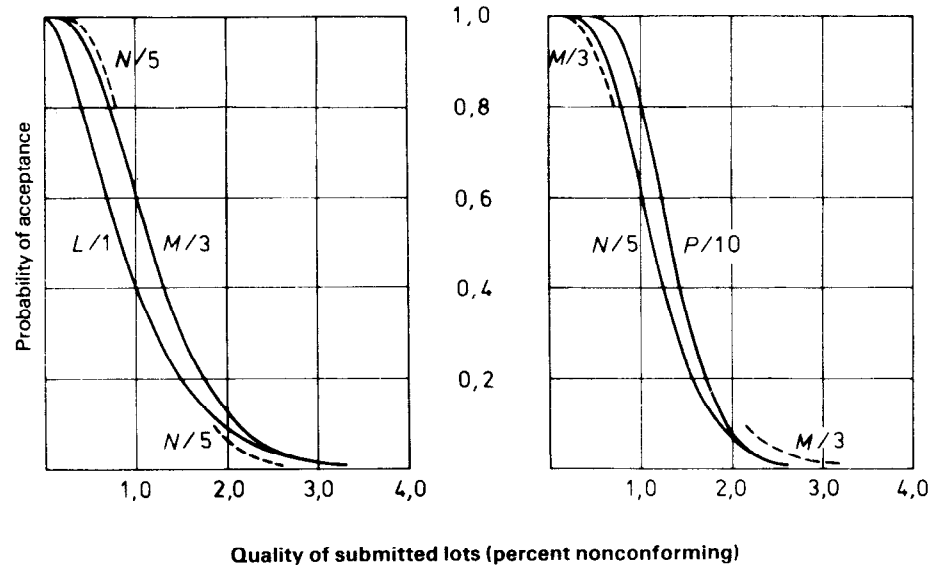
Table B5 — Single sampling plans for limiting quality 3,15 %

Lot sizes for inspection levels					ISO 2859/1 Single sampling plan (Normal inspection)			Code letter	Tabulated values of submitted quality accepted with designated probabilities [1] (quality as percent nonconforming)					Acceptance probabilities for limiting quality [2]	
S-1 to S-3	S-4	I	II	III	AQL	n	Ac		0,95	0,90	0,50	0,10	0,05	max.	min.
> 125 [3]	> 125 [3]	126 [3] to 35 000	126 [3] to 3 200	126 [3] to 1 200	0,40	125	1	K	0,284	0,426	1,34	3,11	3,80	0,093	0,000
		35 001 to 150 000	3 201 to 10 000	1 201 to 3 200	0,65	200	3	L	0,683	0,873	1,84	3,34	3,88	0,122	0,101
		> 150 000	10 001 to 35 000	3 201 to 10 000	0,65	315	5	M	0,829	1,00	1,80	2,94	3,34	0,067	0,058
			> 35 000	> 10 000	1,00	500	10	N	1,231	1,40	2,13	3,08	3,39	0,083	0,078

1) Probability calculated by the Poisson approximation.

2) The exact acceptance probabilities calculated from the hypergeometric distribution vary with lot size, the maximum and minimum values attained for permitted lot sizes are given for each plan.

3) For fewer than 126 in the lot, 100 % inspect the lot.

Operating characteristic curves for single sampling plans

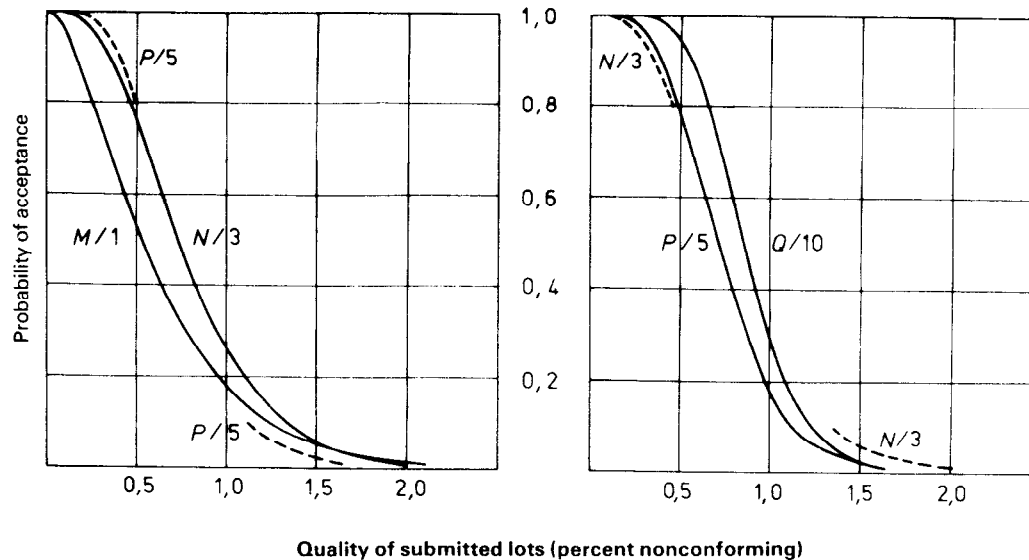(Curves are identified by sample size code)

Quality of submitted lots (percent nonconforming)
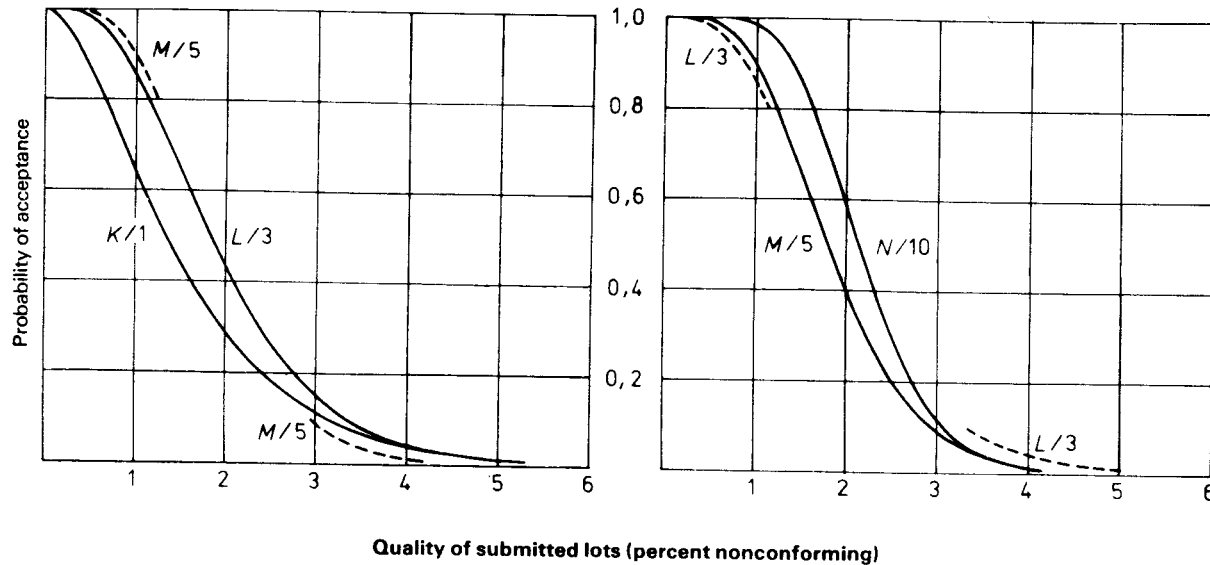
Table B6 — Single sampling plans for limiting quality 5,0 %

Lot sizes for inspection levels					ISO 2859/1 Single sampling plan (Normal inspection)			Code letter	Tabulated values of submitted quality accepted with designated probabilities[1] (quality as percent nonconforming)					Acceptance probabilities for limiting quality[2]	
S-1 to S-3	S-4	I	II	III	AQL	n	Ac		0,95	0,90	0,50	0,10	0,05	max.	min.
>80[3]	81[3] to 500 000	81[3] to 10 000	81[3] to 1 200	81[3] to 500	0,65	80	1	J	0,444	0,666	2,09	4,78	5,80	0,086	0,000
	>500 000	10 001 to 35 000	1 201 to 3 200	501 to 1 200	1,0	125	3	K	1,09	1,40	2,94	5,35	6,20	0,124	0,092
		35 001 to 150 000	3 201 to 10 000	1 201 to 3 200	1,0	200	5	L	1,31	1,58	2,84	4,64	5,26	0,062	0,048
		>150 000	>10 000	>3 200	1,5	315	10	M	1,96	2,23	3,39	4,89	5,38	0,081	0,072

1) Probability calculated by the Poisson approximation for code letters K, L and M. Binomial distribution for code letter J.

2) The exact acceptance probabilities calculated from the hypergeometric distribution vary with lot size, the maximum and minimum values attained for permitted lot sizes are given for each plan.

3) For fewer than 81 in the lot, 100 % inspect the lot.

Operating characteristic curves for single sampling plans

(Curves are identified by sample size code)

Quality of submitted lots (percent nonconforming)
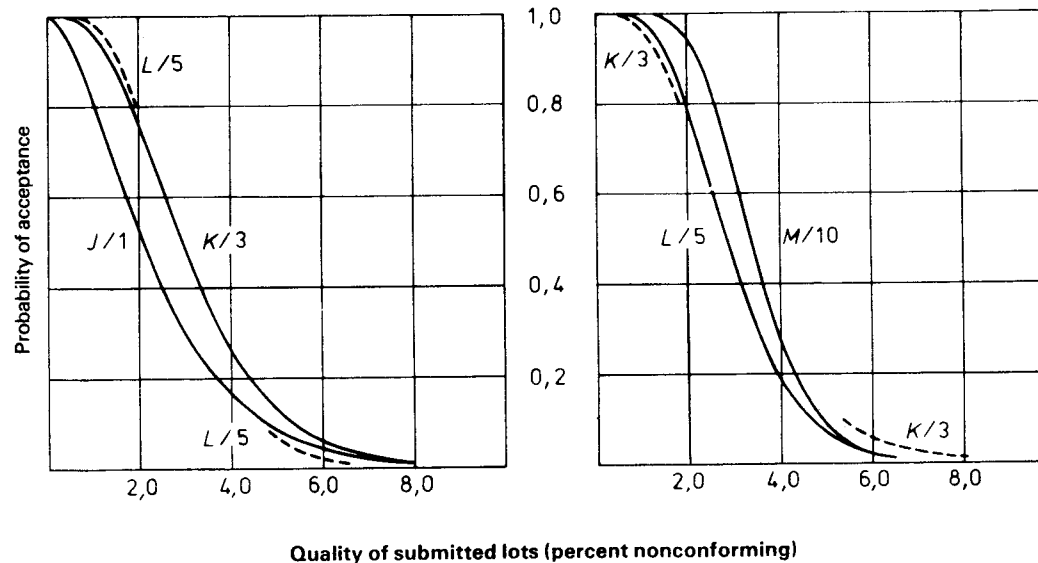
Table B7 — Single sampling plans for limiting quality 8,0 %

Lot sizes for inspection levels					ISO 2859/1 Single sampling plan (Normal inspection)			Code letter	Tabulated values of submitted quality accepted with designated probabilities [1] (quality as percent nonconforming)					Acceptance probabilities for limiting quality [2]	
S-1 to S-3	S-4	I	II	III	AQL	n	Ac		0,95	0,90	0,50	0,10	0,05	max.	min.
> 50 [3]	> 50 [3]	51 [3] to 35 000	51 [3] to 3 200	51 [3] to 500	1,0	50	1	H	0,712	1,07	3,33	7,56	9,13	0,083	0,000
		35 001 to 500 000	3 201 to 10 000	501 to 1 200	1,5	80	3	J	1,73	2,20	4,57	8,16	9,39	0,109	0,090
		> 500 000	10 001 to 35 000	1 201 to 3 200	1,5	125	5	K	2,09	2,52	4,54	7,42	8,41	0,059	0,051
			> 35 000	> 3 200	2,5	200	10	L	3,09	3,51	5,33	7,70	8,48	0,069	0,064

1) Probability calculated by the Poisson approximation for code letters K and L. Binomial distribution for code letters H and J.

2) The exact acceptance probabilities calculated from the hypergeometric distribution vary with lot size, the maximum and minimum values attained for permitted lot sizes are given for each plan.

3) For fewer than 51 in the lot, 100 % inspect the lot.

Operating characteristic curves for single sampling plans

(Curves are identified by sample size code)

Quality of submitted lots (percent nonconforming)
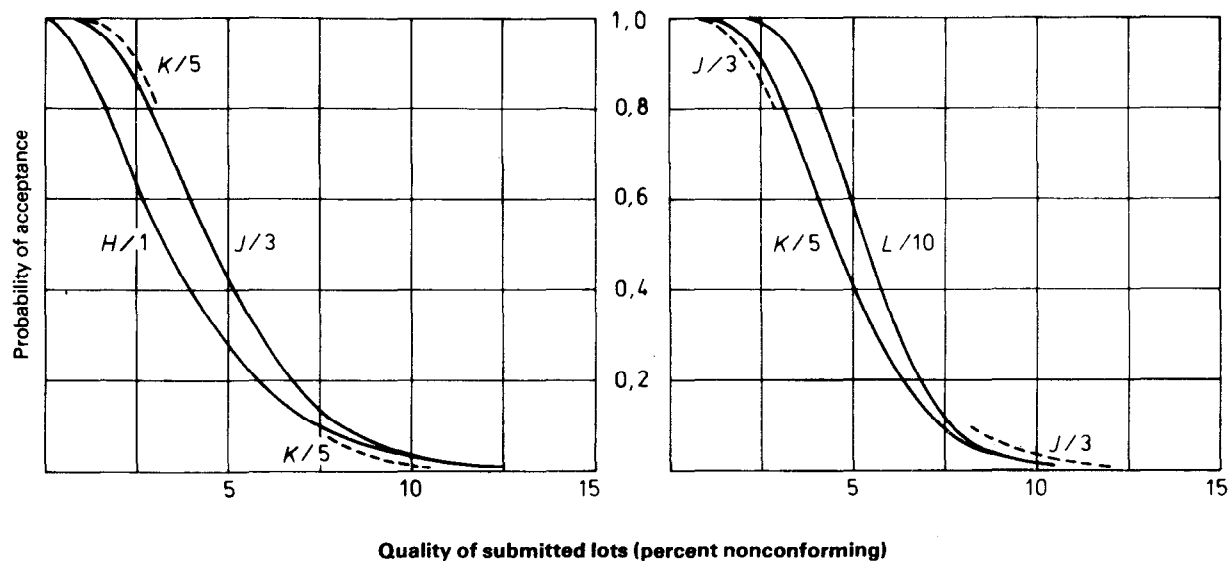
Table B8 — Single sampling plans for limiting quality 12,5 %

Lot sizes for inspection levels					ISO 2859/1 single sampling plan (contrôle normal)			Code letter	Tabulated values of submitted quality accepted with designated probabilities [1] (quality as percent nonconforming)					Acceptance probabilities for limiting quality [2]	
S-1 to S-3	S-4	I	II	III	AQL	n	Ac		0,95	0,90	0,50	0,10	0,05	max.	min.
> 32 [3]	33 [3] to 500 000	33 [3] to 10 000	33 [3] to 1 200	33 [3] to 280	1,5	32	1	G	1,13	1,67	5,19	11,6	14,0	0,078	0,000
	> 500 000	10 001 to 35 000	1 201 to 3 200	281 to 500	2,5	50	3	H	2,77	3,54	7,30	12,9	14,8	0,114	0,094
		35 001 to 500 000	3 201 to 10 000	501 to 1 200	2,5	80	5	J	3,32	3,98	7,06	11,3	12,7	0,055	0,043
		> 500 000	> 10 000	> 1 200	4,0	125	10	K	4,94	5,62	8,53	12,3	13,6	0,077	0,070

1) Probability calculated by the Poisson approximation for code letter K. Binomial distribution for code letters G, H and J.

2) The exact acceptance probabilities calculated from the hypergeometric distribution vary with lot size, the maximum and minimum values attained for permitted lot sizes are given for each plan.

3) For fewer than 33 in the lot, 100 % inspect the lot.

Operating characteristic curves for single sampling plans

(Curves are identified by sample size code)

Quality of submitted lots (percent nonconforming)

13
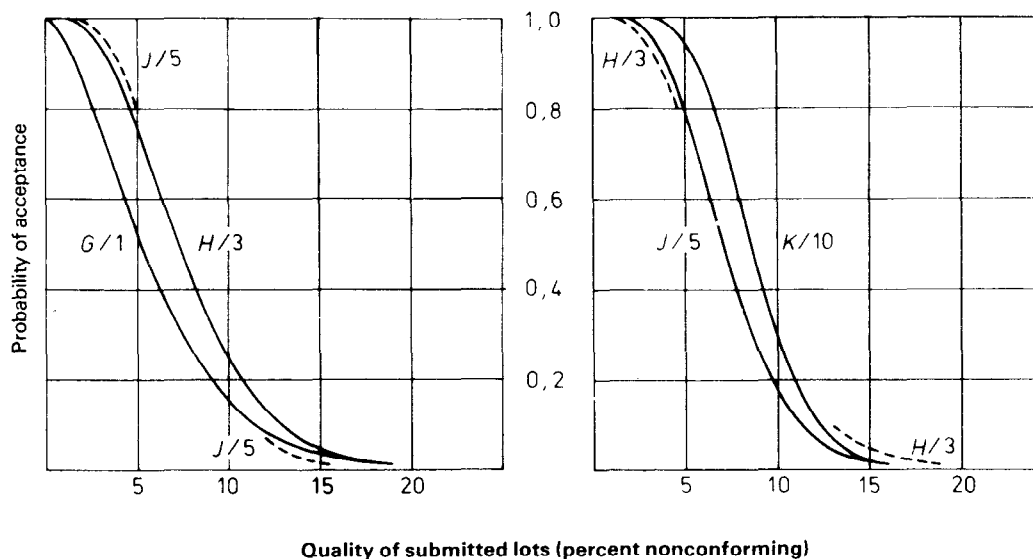
Table B9 — Single sampling plans for limiting quality 20,0 %

Lot sizes for inspection levels					ISO 2859/1 Single sampling plan (Normal inspection)			Code letter	Tabulated values of submitted quality accepted with designated probabilities[1] (quality as percent nonconforming)					Acceptance probabilities for limiting quality[2]	
S-1 to S-3	S-4	I	II	III	AQL	n	Ac		0,95	0,90	0,50	0,10	0,05	max.	min.
> 20[3]	21[3] to 35 000	21[3] to 1 200	21[3] to 500	21[3] to 150	2,5	20	1	F	1,80	2,69	8,25	18,1	21,6	0,069	0,000
	35 001 to 500 000	1 201 to 10 000	501 to 1 200	151 to 280	4,0	32	3	G	4,39	5,56	11,4	19,7	22,5	0,093	0,072
	> 500 000	10 001 to 35 000	1 201 to 3 200	281 to 500	4,0	50	5	H	5,34	6,42	11,3	17,8	19,9	0,048	0,037
		> 35 000	> 3 200	> 500	6,5	80	10	J	7,91	8,95	13,3	18,6	20,3	0,056	0,049

1) Probability calculated by the binomial distribution.

2) The exact acceptance probabilities calculated from the hypergeometric distribution vary with lot size, the maximum and minimum values attained for permitted lot sizes are given for each plan.

3) For fewer than 21 in the lot, 100 % inspect the lot.

Operating characteristic curves for single sampling plans

(Curves are identified by sample size code)

Quality of submitted lots (percent nonconforming)
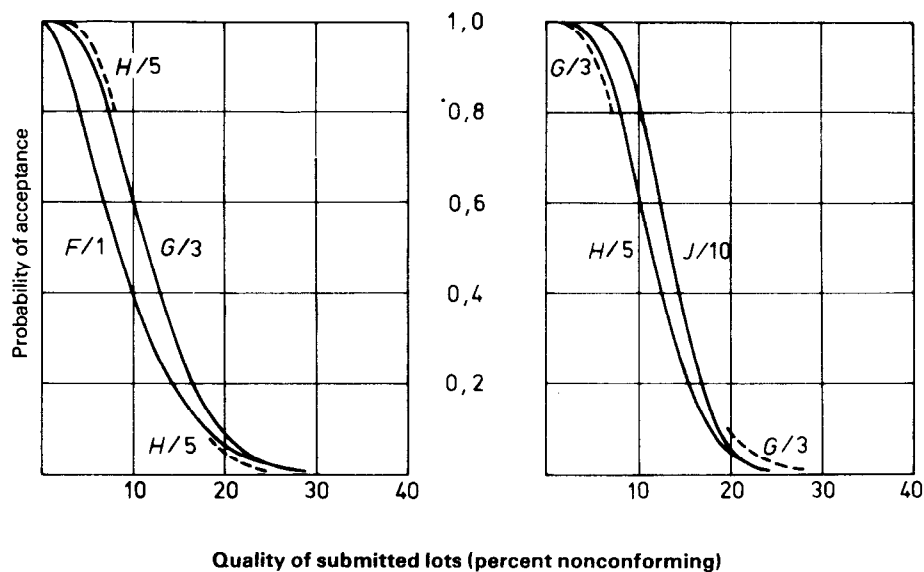
Table B10 — Single sampling plans for limiting quality 32,0 %

Lot sizes for inspection levels					ISO 2859/1 Single sampling plan (Normal inspection)			Code letter	Tabulated values of submitted quality accepted with designated probabilities[1] (quality as percent nonconforming)					Acceptance probabilities for limiting quality[2]	
S-1 to S-3	S-4	I	II	III	AQL	n	Ac		0,95	0,90	0,50	0,10	0,05	max.	min.
> 13[3]	14[3] to 3 200	14[3] to 500	14[3] to 280	14[3] to 90	4,0	13	1	E	2,81	4,16	12,6	26,8	31,6	0,047	0,000
	3 201 to 35 000	501 to 1 200	281 to 500	91 to 150	6,5	20	3	F	7,13	9,03	18,1	30,4	34,4	0,077	0,062
	35 001 to 500 000	1 201 to 10 000	501 to 1 200	151 to 280	6,5	32	5	G	8,5	10,2	17,5	27,1	30,1	0,031	0,022
	> 500 000	> 10 000	> 1 200	> 280	10,0	50	10	H	12,9	14,5	21,2	29,1	31,6	0,044	0,042

1) Probability calculated by the binomial distribution.

2) The exact acceptance probabilities calculated from the hypergeometric distribution vary with lot size, the maximum and minimum values attained for permitted lot sizes are given for each plan.

3) For fewer than 14 in the lot, 100 % inspect the lot.

Operating characteristic curves for single sampling plans

(Curves are identified by sample size code)

Quality of submitted lots (percent nonconforming)
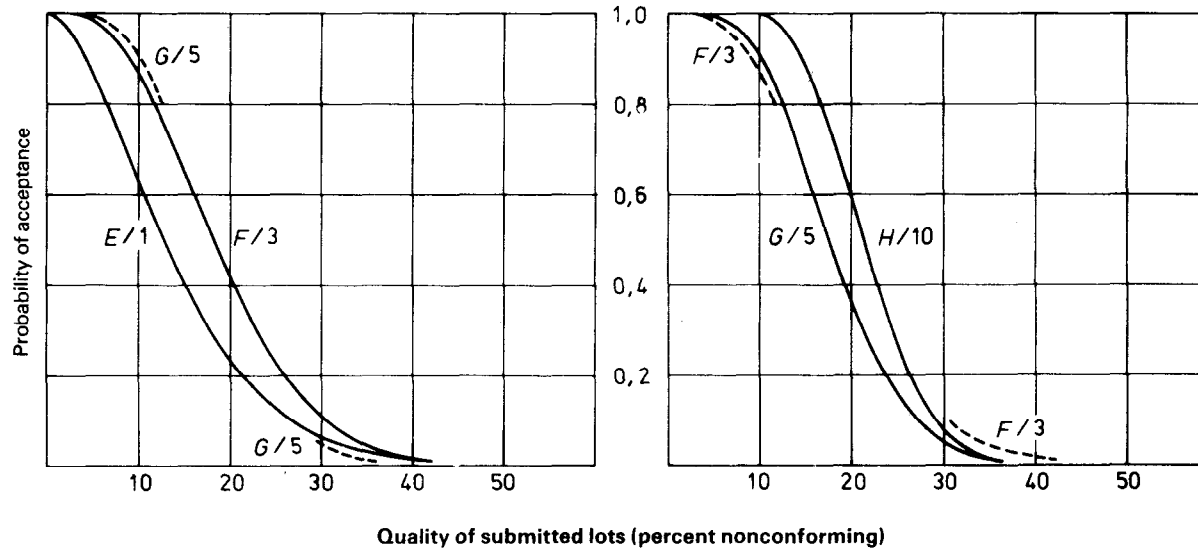
Table C — Relation between limiting quality (LQ) and consumer's risk quality (CRQ)

Preferred value of limiting quality (LQ) %	Corresponding range of CRQ in tables B1 to B10 (at 10 % consumer's risk)	Corresponding range of CRQ in tables B1 to B10 (at 5 % consumers risk)	Corresponding interval[1] for non-standard value of limiting quality (L)
0,5	0,46 < CRQ < 0,54	0,52 < CRQ < 0,62	0,4 ⩽ L < 0,65
0,8	0,74 < CRQ < 0,84	0,84 < CRQ < 0,97	0,65 ⩽ L < 1,0
1,25	1,16 < CRQ < 1,34	1,31 < CRQ < 1,55	1,0 ⩽ L < 1,6
2,0	1,86 < CRQ < 2,12	2,10 < CRQ < 2,46	1,6 ⩽ L < 2,5
3,15	2,94 < CRQ < 3,34	3,34 < CRQ < 3,88	2,5 ⩽ L < 4,0
5,0	4,64 < CRQ < 5,35	5,26 < CRQ < 6,20	4,0 ⩽ L < 6,5
8,0	7,42 < CRQ < 8,16	8,41 < CRQ < 9,39	6,5 ⩽ L < 10,0
12,5	11,3 < CRQ < 12,9	12,7 < CRQ < 14,8	10,0 ⩽ L < 15,0
20,0	17,8 < CRQ < 19,7	19,9 < CRQ < 22,5	15,0 ⩽ L < 25,5
32,0	26,8 < CRQ < 30,4	30,1 < CRQ < 34,4	25,0 ⩽ L < 40,0

1) These plans are intended to be used with the preferred series of limiting qualities. If these plans are introduced where a non-standard limiting quality is already specified, the plans should be entered with the preferred value (LQ) corresponding to the interval containing the non-standard value (L).

Table D1 — Summary of sampling plan properties for procedure A

Sample size/acceptance No. (n/Ac)	Probability of acceptance at the limiting quality [1] (PLQ)
Percent nonconforming (p)	Probability of acceptance at quality (p)

Each cell in the table shows the consumer's risk (PLQ) and the producer's risk point (p, P_a).

Lot size	0,5		0,8		1,25		2,0		3,15		5,0		8,0		12,5		20,0		32,0	
	— Limiting quality in percent (LQ)																			
16 to 25											Inspect every item		17/0	0,094	13/0	0,082	9/0	0,082	6/0	0,070
													0	1,0	0	1,0	0	1,0	0	1,0
26 to 50								Inspect every item		Inspect every item		28/0	0,085	22/0	0,089	15/0	0,090	10/0	0,083	6/0	0,085
													0	1,0	0	1,0	0	1,0	0	1,0	0	1,0
51 to 90						Inspect every item		50/0	2)	44/0	0,094	34/0	0,103	24/0	0,098	16/0	0,094	10/0	0,094	8/0	0,040
								0	1,0	0	1,0	0	1,0	0	1,0	0	1,0	0	1,0	1,0	1,0
91 to 150			Inspect every item		90/0	2)	80/0	0,099	55/0	0,100	38/0	0,103	26/0	0,092	18/0	0,077	13/0	0,048	13/1	0,041
					0	1,0	0	1,0	0	1,0	0	1,0	0	1,0	0	1,0	0	1,0	2,67	0,96
151 to 280	Inspect every item		170/0	0,102	130/0	0,095	95/0	0,089	65/0	0,090	42/0	0,097	28/0	0,086	20/0	0,062	20/1	0,062	13/1	0,044
			0	1,0	0	1,0	0	1,0	0	1,0	0	1,0	0	1,0	0	1,0	1,79	0,96	2,86	0,95
281 to 500	280/0	0,089	220/0	0,097	155/0	0,095	105/0	0,092	80/0	0,061	50/0	0,067	32/0	0,068	32/1	0,071	20/1	0,065	20/3	0,072
	0	1,0	0	1,0	0	1,0	0	1,0	0	1,0	0	1,0	0	1,0	1,00	0,97	1,80	0,95	7,20	0,95
501 to 1 200	380/0	0,101	255/0	0,098	170/0	0,100	125/0	0,069	125/1	0,081	80/1	0,079	50/1	0,078	32/1	0,075	32/3	0,090	32/5	0,029
	0	1,0	0	1,0	0	1,0	0	1,0	0,250	0,97	0,417	0,96	0,667	0,96	1,08	0,95	4,42	0,95	8,50	0,95
1 201 to 3 200	430/0	0,099	280/0	0,095	200/0	0,074	200/1	0,083	125/1	0,088	125/3	0,119	80/3	0,106	50/3	0,112	50/5	0,047	50/10	0,042
	0	1,0	0	1,0	0	1,0	0,188	0,95	0,281	0,95	1,13	0,95	1,75	0,95	2,78	0,95	5,38	0,95	12,9	0,95
3 201 to 10 000	450/0	0,099	315/0	0,076	315/1	0,091	200/1	0,087	200/3	0,120	200/5	0,061	125/5	0,058	80/5	0,055	80/10	0,056	80/18	0,041
	0,010	0,96	0,010	0,97	0,110	0,96	0,180	0,95	0,690	0,95	1,32	0,95	2,12	0,95	3,32	0,95	7,92	0,95	16,1	0,95
10 001 to 35 000	500/0	0,080	500/1	0,089	315/1	0,094	315/3	0,123	315/5	0,066	315/10	0,080	200/10	0,069	125/10	0,077	125/18	0,069	80/18	0,041
	0,009	0,96	0,071	0,95	0,111	0,95	0,437	0,95	0,834	0,95	1,97	0,95	3,99	0,95	5,01	0,95	10,2	0,95	16,1	0,95
35 001 to 150 000	800/1	0,090	500/1	0,090	500/3	0,128	500/5	0,065	500/10	0,083	500/18	0,086	315/18	0,077	200/18	0,078	125/18	0,069	80/18	0,041
	0,044	0,95	0,071	0,95	0,273	0,95	0,524	0,95	1,23	0,95	2,50	0,95	3,99	0,95	6,31	0,95	10,2	0,95	16,1	0,95
150 001 to 500 000	800/1	0,091	800/3	0,118	800/5	0,060	800/10	0,075	800/18	0,082	500/18	0,086	315/18	0,077	200/18	0,078	125/18	0,069	80/18	0,041
	0,044	0,95	0,170	0,95	0,328	0,95	0,771	0,95	1,56	0,95	2,50	0,95	3,99	0,95	6,31	0,95	10,2	0,95	16,1	0,95
> 500 000	1 250/3	0,129	1 250/5	0,066	1 250/10	0,089	1 250/18	0,090	800/18	0,082	500/18	0,086	315/18	0,077	200/18	0,078	125/18	0,069	80/18	0,041
	0,109	0,95	0,209	0,95	0,494	0,95	1,00	0,95	1,56	0,95	2,50	0,95	3,99	0,95	6,31	0,95	10,2	0,95	16,1	0,95

1) The stated probability of acceptance is the maximum for lots of limiting quality in the size range and the minimum for lots with percent nonconforming p. These probabilities are based on the hypergeometric distribution. The producer's risk is (p, P_a), the consumer's risk point is (LQ, PLQ).

2) No lot in this size range can be of limiting quality since this implies a fractional number of nonconforming.

Table D2 — Selected hypergeometric data for OC curves for zero acceptance plans

A sample of size n is drawn from a lot containing R nonconforming items. The lot is accepted if there are nonconforming items in the sample (Ac = 0), the probability of acceptance for the lot (P_a) is shown below for the minimum and maximum lot sizes in the lot size range and the various sampling plans "$n/0$" (printed in bold type).

Limiting quality (LQ)

Lot size range block 1

0,5 — 380/0 (501–1200) R	P_a	P_a	0,8 — 255/0 (501–1200) R	P_a	P_a	1,25 — 170/0 (501–1200) R	P_a	P_a	2,0 — 125/0 (501–1200) R	P_a	P_a	8,0 — 17/0 (16–25) R	P_a	P_a	12,5 — 13/0 (16–25) R	P_a	P_a	20,0 — 9/0 (16–25) R	P_a	P_a	32,0 — 6/0 (16–25) R	P_a	P_a
0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0		1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00
1	0,24	0,68	1	0,49	0,79	1	0,66	0,86	1	0,75	0,90	1		0,32	1	0,19	0,48	1	0,44	0,64	1	0,63	0,76
2	0,06	0,47	2	0,24	0,62	2	0,44	0,74	2	0,56	0,80	2		0,09	2	0,03	0,22	2	0,18	0,40	2	0,38	0,57
3	0,01	0,32	3	0,12	0,49	3	0,29	0,63	3	0,42	0,72	3		0,02	3	0,00	0,10	3	0,06	0,24	3	0,21	0,42
4	0,00	0,22	4	0,06	0,38	6	0,08	0,40	8	0,10	0,41	4		0,01	4	0,00	0,04	4	0,02	0,14	4	0,12	0,31
5	0,00	0,15	5	0,03	0,30	7	0,05	0,34	10	0,05	0,33	5		0,00	5	0,00	0,01	5	0,00	0,08	5	0,06	0,22
6	0,00	0,10	10	0,00	0,09	15	0,00	0,10	20	0,00	0,11	6		0,00	6	0,00	0,01	6	0,00	0,05	7	0,01	0,10
8	0,00	0,05	13	0,00	0,04	19	0,00	0,05	27	0,00	0,05	7		0,00	7	0,00	0,00	7	0,00	0,02	9	0,00	0,05

Lot size range block 2

0,5 — 430/0 (1201–3200) R	P_a	P_a	0,8 — 280/0 (1201–3200) R	P_a	P_a	1,25 — 200/0 (1201–3200) R	P_a	P_a	5,0 — 28/0 (26–50) R	P_a	P_a	8,0 — 22/0 (26–50) R	P_a	P_a	12,5 — 15/0 (26–50) R	P_a	P_a	20,0 — 10/0 (26–50) R	P_a	P_a	32,0 — 6/0 (26–50) R	P_a	P_a
0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0		1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00
1	0,64	0,87	1	0,77	0,91	1	0,83	0,94	1		0,44	1	0,15	0,56	1	0,42	0,70	1	0,62	0,70	1	0,77	0,88
2	0,41	0,75	2	0,59	0,83	2	0,69	0,88	2		0,19	2	0,02	0,31	2	0,17	0,49	2	0,37	0,64	2	0,58	0,77
3	0,26	0,65	3	0,45	0,76	3	0,58	0,82	3		0,08	3	0,00	0,17	3	0,06	0,33	3	0,22	0,50	3	0,44	0,68
5	0,11	0,49	9	0,09	0,44	13	0,09	0,43	4		0,03	4	0,00	0,09	4	0,02	0,23	4	0,12	0,40	7	0,12	0,39
7	0,04	0,36	11	0,05	0,36	16	0,05	0,36	5		0,01	5	0,00	0,05	5	0,01	0,15	6	0,03	0,24	9	0,05	0,28
16	0,00	0,10	25	0,00	0,10	35	0,00	0,10	6		0,00	6	0,00	0,02	6	0,00	0,10	9	0,00	0,11	15	0,00	0,10
21	0,00	0,05	33	0,00	0,05	46	0,00	0,05	7		0,00	7	0,00	0,01	8	0,00	0,04	12	0,00	0,05	19	0,00	0,05

Lot size range block 3

0,5 — 450/0 (3201–10000) R	P_a	P_a	0,8 — 315/0 (3201–10000) R	P_a	P_a	2,0 — 50/0 (51–90) R	P_a	P_a	3,15 — 44/0 (51–90) R	P_a	P_a	5,0 — 34/0 (51–90) R	P_a	P_a	8,0 — 24/0 (51–90) R	P_a	P_a	12,5 — 16/0 (51–90) R	P_a	P_a	20,0 — 10/0 (51–90) R	P_a	P_a	32,0 — 8/0 (51–90) R	P_a	P_a
0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00
1	0,86	0,96	1	0,90	0,97	1	0,02	0,44	1	0,14	0,51	1	0,33	0,62	1	0,53	0,73	1	0,69	0,82	1	0,80	0,89	1	0,84	0,91
2	0,74	0,91	2	0,81	0,94	2	0,00	0,19	2	0,02	0,26	2	0,11	0,38	2	0,28	0,54	2	0,47	0,67	2	0,64	0,79	2	0,71	0,83
3	0,63	0,87	3	0,73	0,91	3	0,00	0,08	3	0,00	0,13	3	0,03	0,24	3	0,14	0,39	3	0,31	0,55	3	0,51	0,70	3	0,59	0,75
15	0,10	0,50	22	0,10	0,49	4	0,00	0,04	4	0,00	0,06	4	0,01	0,14	4	0,07	0,28	6	0,09	0,30	10	0,09	0,29	12	0,10	0,30
20	0,05	0,40	29	0,05	0,39	5	0,00	0,01	5	0,00	0,03	5	0,00	0,09	5	0,03	0,20	8	0,04	0,19	12	0,05	0,22	15	0,05	0,22
50	0,00	0,10	72	0,00	0,10	6	0,00	0,01	6	0,00	0,02	6	0,00	0,05	7	0,01	0,10	11	0,01	0,05	18	0,01	0,09	22	0,01	0,10
65	0,00	0,05	93	0,00	0,05	7	0,00	0,00	7	0,00	0,01	7	0,00	0,03	9	0,00	0,05	14	0,00	0,05	22	0,00	0,05	27	0,00	0,05

Lot size range block 4

0,5 — 500/0 (10001–35000) R	P_a	P_a	1,25 — 90/0 (91–150) R	P_a	P_a	2,0 — 80/0 (91–150) R	P_a	P_a	3,15 — 55/0 (91–150) R	P_a	P_a	5,0 — 38/0 (91–150) R	P_a	P_a	8,0 — 26/0 (91–150) R	P_a	P_a	12,5 — 18/0 (91–150) R	P_a	P_a	20,0 — 13/0 (91–150) R	P_a	P_a
0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00
1	0,95	0,99	1	0,01	0,40	1	0,12	0,47	1	0,40	0,63	1	0,58	0,75	1	0,71	0,83	1	0,80	0,88	1	0,86	0,91
2	0,90	0,97	2	0,00	0,16	2	0,01	0,22	2	0,15	0,40	2	0,34	0,56	2	0,51	0,68	2	0,64	0,77	2	0,73	0,83
3	0,86	0,96	3	0,00	0,06	3	0,00	0,10	3	0,06	0,25	3	0,19	0,41	3	0,36	0,56	3	0,51	0,68	3	0,63	0,76
45	0,10	0,52	4	0,00	0,02	4	0,00	0,05	4	0,02	0,16	4	0,11	0,31	7	0,09	0,26	10	0,10	0,27	14	0,10	0,26
58	0,05	0,43	5	0,00	0,01	5	0,00	0,02	5	0,01	0,10	5	0,06	0,23	8	0,06	0,21	13	0,04	0,18	17	0,05	0,20
160	0,00	0,10	6	0,00	0,00	6	0,00	0,01	6	0,00	0,06	8	0,01	0,09	12	0,01	0,09	17	0,02	0,10	23	0,02	0,10
208	0,00	0,05	7	0,00	0,00	7	0,00	0,00	7	0,00	0,04	10	0,00	0,05	15	0,00	0,05	22	0,00	0,05	30	0,00	0,05

Table D2 — Selected hypergeometric data for OC curves for zero acceptance plans (concluded)

Limiting quality (LQ) — Lot size 151 / 280

LQ 0,8 — 170/0			LQ 1,25 — 130/0			LQ 2,0 — 95/0			LQ 3,15 — 65/0			LQ 5,0 — 42/0			LQ 8,0 — 28/0			LQ 12,5 — 20/0		
R	P_a 151	P_a 280	R	P_a 151	P_a 280	R	P_a 151	P_a 280	R	P_a 151	P_a 280	R	P_a 151	P_a 280	R	P_a 151	P_a 280	R	P_a 151	P_a 280
0		1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00
1		0,39	1	0,14	0,54	1	0,37	0,66	1	0,57	0,77	1	0,72	0,85	1	0,81	0,90	1	0,87	0,93
2		0,15	2	0,02	0,29	2	0,14	0,44	2	0,32	0,59	2	0,52	0,72	2	0,66	0,81	2	0,75	0,86
3		0,06	3	0,00	0,15	3	0,05	0,29	3	0,18	0,45	3	0,37	0,61	11	0,10	0,31	15	0,11	0,32
4		0,02	4	0,00	0,08	4	0,02	0,19	4	0,10	0,35	7	0,10	0,32	14	0,05	0,22	20	0,05	0,22
5		0,01	5	0,00	0,04	5	0,01	0,12	5	0,06	0,26	9	0,05	0,23	21	0,01	0,10	29	0,01	0,10
6		0,00	6	0,00	0,02	6	0,00	0,08	9	0,01	0,09	14	0,01	0,10	27	0,00	0,05	38	0,00	0,05
7		0,00	7	0,00	0,01	7	0,00	0,05	11	0,00	0,05	18	0,00	0,05						

Lot size 281 / 500

LQ 0,5 — 280/0			LQ 0,8 — 220/0			LQ 1,25 — 155/0			LQ 2,0 — 105/0			LQ 3,15 — 80/0			LQ 5,0 — 50/0			LQ 8,0 — 32/0		
R	P_a 281	P_a 500	R	P_a 281	P_a 500	R	P_a 281	P_a 500	R	P_a 281	P_a 500	R	P_a 281	P_a 500	R	P_a 281	P_a 500	R	P_a 281	P_a 500
0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00	0	1,00	1,00
1	0,00	0,44	1	0,22	0,56	1	0,45	0,69	1	0,63	0,79	1	0,72	0,84	1	0,82	0,90	1	0,89	0,94
2	0,00	0,19	2	0,05	0,31	2	0,20	0,48	2	0,39	0,62	2	0,51	0,71	2	0,68	0,81	2	0,78	0,88
3	0,00	0,08	3	0,01	0,17	3	0,09	0,33	3	0,24	0,49	3	0,36	0,59	3	0,55	0,73	3	0,69	0,82
4	0,00	0,04	4	0,00	0,10	4	0,04	0,23	5	0,09	0,31	7	0,09	0,29	12	0,09	0,28	18	0,11	0,30
5	0,00	0,02	5	0,00	0,05	5	0,02	0,15	6	0,06	0,24	9	0,05	0,21	15	0,05	0,20	24	0,05	0,20
6	0,00	0,01	6	0,00	0,03	6	0,01	0,11	10	0,01	0,09	13	0,01	0,10	21	0,01	0,10	33	0,01	0,10
7	0,00	0,00	7	0,00	0,02	8	0,00	0,05	13	0,00	0,04	17	0,00	0,05	28	0,00	0,05	43	0,00	0,05

Table D3 — Equivalent sample sizes for single, double and multiple sampling plans

Type of sampling plan		Sample size code letter and cumulative sample sizes[1] in accordance with ISO 2859/1											
		E	F	G	H	J	K	L	M	N	P	Q	R
Single		13	20	32	50	80	125	200	315	500	800	1 250	2 000
Double	1st	8	13	20	32	50	80	125	200	315	500	800	1 250
	2nd	16	26	40	64	100	160	250	400	630	1 000	1 600	2 500
Multiple	1st	3	5	8	13	20	32	50	80	125	200	315	500
	2nd	6	10	16	26	40	64	100	160	250	400	630	1 000
	3rd	9	15	24	39	60	96	150	240	375	600	945	1 500
	4th	12	20	32	52	80	128	200	320	500	800	1 260	2 000
	5th	15	25	40	65	100	160	250	400	625	1 000	1 575	2 500
	6th	18	30	48	78	120	192	300	480	750	1 200	1 890	3 000
	7th	21	35	56	91	140	224	350	560	875	1 400	2 205	3 500

1) For double and multiple sampling plans, the tabulated entries are the cumulative sample sizes. In each case the successive stages of sampling take a fresh sample equal in size to that taken in the first stage. This sample is aggregated with the samples from previous stages and the combined sample is then tested by the criterion in table D4.

Table D4 — Equivalent acceptance numbers for single, double and multiple sampling plans

Type of sampling plan	Approximate relative sample sizes at each stage[1] n	Acceptance number codes									
		1		3		5		10		18[2]	
		Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re
Single	1	1	2	3	4	5	6	10	11	18	19
Double	0,63	0	2	1	4	2	5	5	9	9	14
	0,63	1	2	4	5	6	7	12	13	23	24
Multiple	0,25	3)	2	3)	3	3)	4	0	5	1	8
	0,25	3)	2	0	3	1	5	3	8	6	12
	0,25	0	2	1	4	2	6	6	10	11	17
	0,25	0	3	2	5	3	7	8	13	16	22
	0,25	1	3	3	6	5	8	11	15	22	25
	0,25	1	3	4	6	7	9	14	17	27	29
	0,25	2	3	6	7	9	10	18	19	32	33
Discrimination ratio (Procedure B) P_{10}/P_{95}		10,9		4,89		3,55		2,50		2)	
Probability of acceptance at AQL (Procedure B)		0,91		0,96		0,98		0,98		2)	

1) These relative samples are approximate only. The exact values are given in table D3 for each sample size code letter.

2) This acceptance number is only used in procedure A.

3) Acceptance of the lot is not permitted on the samples examined.

Table D5 — Correspondence between lot sizes, AQL values in ISO 2859/1 and LQ values
(Inspection levels I and II, procedure B)

Lot size	Use code letter [1]	Sample size	\<AQL values in ISO 2859/1 for limiting qualities (LQ) [2]\> Limiting quality (LQ)									
			0,5	0,8	1,25	2,0	3,15	5,0	8,0	12,5	20,0	32,0
2 to 90	E	13										
91 to 150	E	13										4,0
151 to 280	F	20									2,5	6,5
281 to 500	G	32								1,5	4,0	6,5
501 to 1 200	H	50							1,0	2,5	4,0	10,0
1 201 to 3 200	J	80						0,65	1,5	2,5	6,5	
3 201 to 10 000	K	125					0,40	1,0	1,5	4,0		
10 001 to 35 000	L	200				0,25	0,65	1,0	2,5			
35 001 to 150 000	M	315			0,15	0,40	0,65	1,5				
150 001 to 500 000	N	1 500		0,10	0,25	0,40	1,0					
> 500 000	P	800	0,065	0,15	0,25	0,65						
	Q	1 250	0,10	0,15	0,40							
	R	2 000	0,10									

1) The correspondence between lot size and sample size is determined by the inspection level. The sample size code letter to use is indicated by the head of the arrow corresponding to the given inspection level, usually up one row for level I and down one row for level II.

2) When no AQL value appears in the table for a selected code letter and LQ value, an arrow will indicate that the sample size has to be increased if it points downwards and decreased if it points upwards. The sample size and AQL value to be used correspond to the entry at the head of the arrow. When this sample size is greater than the lot size all items in the lot have to be inspected.

Table D6 — Correspondence between lot sizes and sample size code letters
(Inspection levels S-1 to S-4 and I to III, procedure B)

Lot size	Special inspection levels			General inspection levels		
	S-1 and S-2	S-3	S-4	I	II	III
2 to 90	E	E	E	E	E	F
91 to 150	E	E	E	E	F	G
151 to 280	E	E	E	E	G	H
281 to 500	E	E	E	F	H	J
501 to 1 200	E	E	F	G	J	K
1 201 to 3 200	E	E	G	H	K	L
3 201 to 10 000	E	F	G	J	L	M
10 001 to 35 000	E	F	H	K	M	N
35 001 to 150 000	E	G	J	L	N	P
150 001 to 500 000	E	G	J	M	P	Q
> 500 000	E	H	K	N	Q	R

NOTE — The sample size code letter indicates the appropriate row in table D5; it does not always indicate the sample size to be used directly since this can depend on the limiting quality. Levels S-1 and S-2, for example, give sample sizes independent of lot size but dependent on limiting quality, ranging from 13 to 800.

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