SLOVENSKI STANDARD
SIST ISO 5538:2000

01-maj-2000

Mleko in mleļ ni proizvodi - Vzorļ enje - Nadzor po znaļ ilnostih

Milk and milk products -- Sampling -- Inspection by attributes

Lait et produits laitiers -- Échantillonnage -- Contrôle par attributs

Ta slovenski standard je istoveten z: **ISO 5538:1987**

ICS:

67.100.01	Mleko in mleļ ni proizvodi na sploġno	Milk and milk products in general

SIST ISO 5538:2000 **en**

INTERNATIONAL STANDARD

ISO 5538

First edition
1987-12-15

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Milk and milk products — Sampling — Inspection by attributes

Lait et produits laitiers — Échantillonnage — Contrôle par attributs

Reference number
ISO 5538 : 1987 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 5538 was prepared by Technical Committee ISO/TC 34, *Agricultural food products,* in collaboration with the International Dairy Federation (IDF) and the Association of Official Analytical Chemists (AOAC) and will also be published by these organizations.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Printed in Switzerland

Milk and milk products — Sampling — Inspection by attributes

0 Introduction

The sampling theory used in this International Standard is based on classifying a unit as "good" or "defective". A "good" unit is one which meets the requirements of a specification, while a "defective" unit is one which does not. It is essential that the sample is taken at random. If it is not, the sampling plans will not give the stated protection. See annex A.

1 Scope and field of application

1.1 This International Standard specifies sampling plans for the inspection by attributes of milk and milk products. It is intended to be used to choose a sample size for any situation where it is required to measure the conformity to a specification of a lot of a dairy product by examination of a representative sample. Methods of sampling for milk and milk products are given in ISO 707.

1.2 This International Standard is applicable to the sampling of all milk products submitted in discrete lots, irrespective of whether the lots are from the same production. The acceptance or otherwise of any lot is a matter for the parties to a contract and is outside the scope of this International Standard.

1.3 This International Standard is intended to be used in all cases where attribute sampling plans are required for a dairy product, except that if specific compositional standards, specifications or contracts include different sampling schemes, those schemes are to be used.

1.4 This International Standard is not applicable to sampling for microbiological defects, unless otherwise agreed by the interested parties.

2 References

ISO 707, *Milk and milk products — Methods of sampling.*

ISO 2859 : 1974, *Sampling procedures and tables for inspection by attributes.* [1]

ISO 2859 : 1974/Addendum 1 : 1977, *General information on sampling inspection, and guide to the use of the ISO 2859 tables.* [1]

ISO 3534, *Statistics — Vocabulary and symbols.*

3 Definitions

For the purpose of this International Standard, the definitions given in ISO 3534 apply.

4 ISO 2859 sampling plans

ISO 2859 describes plans for use in all situations, and gives an account of the theoretical background to the sampling tables. The plans are indexed by batch or lot size and acceptable quality level (AQL). AQL is defined in ISO 2859 and in its Addendum 1, it can be considered to be the average level of quality which if maintained by a producer would result in the acceptance of most of his production.

5 Selection of sampling plan

5.1 Classification of defects

Before selection of a sampling plan, the contract or specification shall clearly define all critical, major and minor defects in such a way that they are unambiguously understood by all users of the contract, specification or document containing or referring to the sampling plan.

5.1.1 A **critical defect** is one that would make the product unacceptable. For the purpose of this International Standard, critical defects relate to the presence of toxic contaminants at a critically high level. Examples include heavy metals and pesticide residues.

In this case, the method to be adopted shall be that described in annex B[2]. It is necessary to decide on an acceptable risk of not detecting a certain percentage of defectives, where a defective is a unit which contains more than the critical level of the contaminant. It is impossible to guarantee freedom from contamination.

5.1.2 A **major defect** is one that is likely to make the product unfit for use, i.e., in the case of milk and milk products, unfit for sale to the consumer. A major defect would result in the

1) The edition of ISO 2859 relevant to this International Standard is currently under revision. Any necessary alterations, for example in terminology, as a consequence of this revision will be carried out to this International Standard when it is next revised.

2) Annex B is an extract of clause 9 of ISO 2859/Addendum 1.

product spoiling or becoming unfit for sale or processing. Examples include

a) composition defect, where this would affect keeping quality;

b) contamination with inhibitory substances;

c) integrity of packaging;

d) visible contamination with dirt.

Sampling plans for major defects shall be selected from the tables using an AQL of not more than 6,5 %.

5.1.3 A **minor defect** is a failure to comply with a specification, but which does not make the unit unfit for use and sale, nor cause it to spoil. Examples include

a) a unit, the chemical composition or net content of which falls outside, but close to, a specification limit;

b) small abnormalities in appearance.

Sampling plans for minor defects shall be selected from the tables using an AQL of not more than 10 %.

5.2 Choice of inspection level and AQL

5.2.1 The sampling plan shall be selected from the tables, using the lot size and the agreed AQL.

In these tables, n is the sample size, Ac is the acceptance number, and Re is the rejection number.

Example :

For a sample size of $n = 13$, Ac = 0 and Re = 1, this means that if a sample of 13 units contains no defectives, the lot shall be accepted; if the sample contains 1 defective, the lot shall be rejected.

Tables 1 to 5 are derived from ISO 2859 and refer to Inspection Levels I, S-4, S-3, S-2 and S-1. Inspection Level I is preferred.

Using any of the S plans will result in increased risks, and they shall not be used without first checking that the associated risk is acceptable. Details of these risks are given in 5.2.2.

5.2.2 Inspection Levels S-4, S-3, S-2 and S-1 may be used where relatively small sample sizes are necessary and large sample risks can or must be tolerated. As a consequence of using these special levels, there is an increased probability of making a wrong decision. Firstly, the consumer's risk increases. This is illustrated in tables 6 to 9. Table 6 refers to plans with an AQL of 2,5 %, table 7 to an AQL of 4,0 %, table 8 to an AQL of 6,5 % and table 9 to an AQL of 10 %.

Each table contains :

— the sample size (n) and the appropriate lot size at the separate inspection levels;

— maximum number of defective units permitted in the sample — acceptance number (Ac);

— minimum number of defective units required in the sample to reject the lot — rejection number (Re);

— limiting quality — LQ.

If the sample size is small, LQ is high; if the sample size increases, LQ is reduced at the same AQL.

For example, in table 6, the inspection plan in which the sample size is 5 and LQ = 45 % appears in all the inspection levels but only at S-1 level can all lot sizes be inspected.

At the S-4 and I Inspection Levels the sample size of 5 can only be taken when the lot size does not exceed 150.

The fact that the consumer's risk (and at the same time the LQ) becomes smaller as the size of the inspected lot becomes greater, is justified on economic grounds.

Inspection plans in which the LQ is several times greater than the AQL are unsuitable for both consumer and producer. If a lot of 35 000 units is considered, Inspection Level I would require a sample size of 125, giving an LQ of 11 % (i.e. 95 % of lots containing 11 % of defects would be rejected). S-1 would require a sample size of 5, giving an LQ of 45 %. An LQ of 45 % is so much greater than the AQL of 2,5 % that the concept of AQL has become meaningless. Furthermore, the sample of 5 would wrongly reject more than 10 % of lots containing 2,5 % of defects.

Increasing the sample size increases both the protection to the consumer, and the discrimination of the sampling plan; this increased discrimination is one of the major reasons for relating sample size to lot size. Users of this International Standard will find full operating characteristics for each plan in ISO 2859; these relate the probability of acceptance to per cent defective in the lot.

6 Records

Successful operation of this type of sampling plan requires the maintenance of comprehensive records of the results of inspection, and the plan in use. Interchange of information between both parties would be useful, and it is recommended that each party make such information available to the other as required.

7 Selection of units

The sampling theory used for the plans in ISO 2859 and thus in this International Standard assumes that sampling is at random, which means that each unit in the lot should have the same probability of appearing in the sample. Every effort shall be made to obtain a random sample. Whenever possible a formal randomization procedure, as described in ISO 2859/Addendum 1, clause 15, should be used (see annex C). If this is not done, the risks associated with the plans cannot be assumed to be those expected. Formal randomization is not difficult, although it can be tedious and time-consuming.

Table 1.1 — Inspection Level I — AQL = 2,5 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 150	5	0	1	8	0	1	2	0	1
151 to 500	20	1	2	32	1	2	8	0	2
501 to 1 200	32	2	3	32	1	2	13	1	3
1 201 to 3 200	50	3	4	50	2	3	20	1	4
3 201 to 10 000	80	5	6	80	3	4	32	2	5
10 001 to 35 000	125	7	8	125	5	6	50	3	6
35 001 to 150 000	200	10	11	200	8	9	80	5	8
150 001 to 500 000	315	14	15	315	12	13	125	7	10
Over 500 000	500	21	22	500	18	19	200	10	13

Table 1.2 — Inspection Level I — AQL = 4,0 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 90	3	0	1	5	0	1	2	0	1
91 to 280	13	1	2	20	1	2	5	0	2
281 to 500	20	2	3	20	1	2	8	1	3
501 to 1 200	32	3	4	32	2	3	13	1	4
1 201 to 3 200	50	5	6	50	3	4	20	2	5
3 201 to 10 000	80	7	8	80	5	6	32	3	6
10 001 to 35 000	125	10	11	125	8	9	50	5	8
35 001 to 150 000	200	14	15	200	12	13	80	7	10
Over 150 000	315	21	22	315	18	19	125	10	13

Table 1.3 — Inspection Level I — AQL = 6,5 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 25	2	0	1	3	0	1	2	0	1
26 to 150	8	1	2	13	1	2	3	0	2
151 to 280	13	2	3	13	1	2	5	1	3
281 to 500	20	3	4	20	2	3	8	1	4
501 to 1 200	32	5	6	32	3	4	13	2	5
1 201 to 3 200	50	7	8	50	5	6	20	3	6
3 201 to 10 000	80	10	11	80	8	9	32	5	8
10 001 to 35 000	125	14	15	125	12	13	50	7	10
Over 35 000	200	21	22	200	18	19	80	10	13

Table 1.4 — Inspection Level I — AQL = 10 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 90	5	1	2	8	1	2	2	0	2
91 to 150	8	2	3	8	1	2	3	1	3
151 to 280	13	3	4	13	2	3	5	1	4
281 to 500	20	5	6	20	3	4	8	2	5
501 to 1 200	32	7	8	32	5	6	13	3	6
1 201 to 3 200	50	10	11	50	8	9	20	5	8
3 201 to 10 000	80	14	15	80	12	13	32	7	10
Over 10 000	125	21	22	125	18	19	50	10	13

Table 2.1 — Inspection Level S-4 — AQL = 2,5 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 150	5	0	1	8	0	1	2	0	1
151 to 1 200	20	1	2	32	1	2	8	0	2
1 201 to 10 000	32	2	3	32	1	2	13	1	3
10 001 to 35 000	50	3	4	50	2	3	20	1	4
35 001 to 500 000	80	5	6	80	3	4	32	2	5
Over 500 000	125	7	8	125	5	6	50	3	6

Table 2.2 — Inspection Level S-4 — AQL = 4,0 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 90	3	0	1	5	0	1	2	0	1
91 to 500	13	1	2	20	1	2	5	0	2
501 to 1 200	20	2	3	20	1	2	8	1	3
1 201 to 10 000	32	3	4	32	2	3	13	1	4
10 001 to 35 000	50	5	6	50	3	4	20	2	5
35 001 to 500 000	80	7	8	80	5	6	32	3	6
Over 500 000	125	10	11	125	8	9	50	5	8

Table 2.3 — Inspection Level S-4 — AQL = 6,5 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 25	2	0	1	3	0	1	2	0	1
26 to 150	8	1	2	13	1	2	3	0	2
151 to 500	13	2	3	13	1	2	5	1	3
501 to 1 200	20	3	4	20	2	3	8	1	4
1 201 to 10 000	32	5	6	32	3	4	13	2	5
10 001 to 35 000	50	7	8	50	5	6	20	3	6
35 001 to 500 000	80	10	11	80	8	9	32	5	8
Over 500 000	125	14	15	125	12	13	50	7	10

Table 2.4 — Inspection Level S-4 — AQL = 10 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 90	5	1	2	8	1	2	2	0	2
91 to 150	8	2	3	8	1	2	3	1	3
151 to 500	13	3	4	13	2	3	5	1	4
501 to 1 200	20	5	6	20	3	4	8	2	5
1 201 to 10 000	32	7	8	32	5	6	13	3	6
10 001 to 35 000	50	10	11	50	8	9	20	5	8
35 001 to 500 000	80	14	15	80	12	13	32	7	10
Over 500 000	125	21	22	125	18	19	50	10	13

Table 3.1 — Inspection Level S-3 — AQL = 2,5 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 500	5	0	1	8	0	1	2	0	1
501 to 35 000	20	1	2	32	1	2	8	0	2
35 001 to 500 000	32	2	3	32	1	2	13	1	3
Over 500 000	50	3	4	50	2	3	20	1	4

Table 3.2 — Inspection Level S-3 — AQL = 4,0 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 150	3	0	1	5	0	1	2	0	1
151 to 3 200	13	1	2	20	1	2	5	0	2
3 201 to 35 000	20	2	3	20	1	2	8	1	3
35 001 to 500 000	32	3	4	32	2	3	13	1	4
Over 500 000	50	5	6	50	3	4	20	2	5

Table 3.3 — Inspection Level S-3 — AQL = 6,5 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 50	2	0	1	3	0	1	2	0	1
51 to 500	8	1	2	13	1	2	3	0	2
501 to 3 200	13	2	3	13	1	2	5	1	3
3 201 to 35 000	20	3	4	20	2	3	8	1	4
35 001 to 500 000	32	5	6	32	3	4	13	2	5
Over 500 000	50	7	8	50	5	6	20	3	6

Table 3.4 — Inspection Level S-3 — AQL = 10 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 150	5	1	2	8	1	2	2	0	2
151 to 500	8	2	3	8	1	2	3	1	3
501 to 3 200	13	3	4	13	2	3	5	1	4
3 201 to 35 000	20	5	6	20	3	4	8	2	5
35 001 to 500 000	32	7	8	32	5	6	13	3	6
Over 500 000	50	10	11	50	8	9	20	5	8

Table 4.1 — Inspection Level S-2 — AQL = 2,5 %

Lot size	Normal inspection			Tightened inspection			Reduced inspection		
	n	Ac	Re	*n*	Ac	Re	*n*	Ac	Re
Up to 35 000	5	0	1	8	0	1	2	0	1
Over 35 000	20	1	2	32	1	2	8	0	2