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Cereals and cereal products — Sampling

Céréales et produits céréaliers — Échantillonnage

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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

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.

ISO 24333 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 338, *Cereal and cereal products*, in collaboration with Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 4, *Cereals and pulses*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition of ISO 24333 cancels and replaces ISO 6644:2002[5] and ISO 13690:1999[7].

Introduction

Sampling is a procedure which requires both a method and equipment that are suitable for the task. Any analysis of the characteristics of a lot and any interpretation of the results would prove futile if the sample were not representative of the lot from which it was taken.

Sampling is a procedure which requires a great deal of care. It is strongly recommended that the task be entrusted to personnel who have been trained to use the appropriate equipment.

Cereals and cereal products — Sampling

1 Scope

This International Standard specifies requirements for the dynamic or static sampling, by manual or mechanical means, of cereals and cereal products, for assessment of their quality and condition.

It is applicable to sampling for the determination of heterogeneously distributed contaminants, undesirable substances, and parameters usually homogeneously distributed like those used to assess quality or compliance with specification.

It can be used to determine insects in a grain lot.

NOTE 1 Other methods, e.g. trapping whilst grain is in storage, are more suitable to assess pest populations.

It is applicable to sampling for assessment of the quality and condition of lots of genetically modified organisms (GMO) but is inappropriate for the determination of the presence of adventitious genetically modified material in non-GM product.

It is not applicable to seed grain.

NOTE 2 The sampling of seed grain is governed by the rules established by the ISTA (International Seed Testing Association).

NOTE 3 At the time of publication, there is no study to support the inclusion of the sampling of non-GM product in order to determine adventitious GM presence within the scope of this International Standard.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
lot
⟨cereals⟩ identified quantity of material (cereal or cereal product) from which a sample can be taken and controlled to determine one (or several) characteristic(s)

2.2
sampling
act of drawing or constituting a sample

[ISO 3534-2:2006[3], 1.3.1]

2.3
increment
⟨cereals⟩ amount of material taken at one time at each individual sampling point throughout a lot

NOTE Adapted from ISO 3534-2:2006[3], 5.2.7.

2.4
aggregate sample
composite sample
⟨cereals⟩ aggregation of two or more **increments** (2.3), taken by experimental **sampling** (2.2) throughout a **lot** (2.1), combined and homogenized

NOTE Adapted from ISO 3534-2:2006[3], 5.3.4.

2.5
laboratory sample
⟨cereals⟩ sample prepared by homogenizing and dividing an **aggregate sample** (2.4) for sending to the laboratory and intended for inspection or testing

NOTE Adapted from ISO 6206:1979[4], 3.2.10.

2.6
homogenization
thorough blending by mechanical or manual means so that contaminants and physical properties are evenly distributed throughout the aggregate or laboratory sample

2.7
packed unit
quantity of grain or milled product packed in a sack, a bag or a retail pack

2.8
sampling error
⟨cereals⟩ that part of total estimation of error of a characteristic due to the heterogeneity of the characteristics, the nature of sampling and to known and acceptable deficiencies in the sampling plan

NOTE Adapted from ISO 7002:1986[6], A.42.

3 General requirements

3.1 In this International Standard, sampling includes the following stages:

a) taking a defined number of increments to constitute an aggregate sample;

b) homogenization of the aggregate sample;

c) reduction of the aggregate sample into laboratory sample(s).

3.2 Since the composition of the lots of cereals is rarely homogeneous and since certain contaminants are distributed in a non-uniform way, a sufficient number of increments shall be taken and carefully mixed to constitute an aggregate sample from which it will subsequently be possible to obtain one or several laboratory sample(s).

For non-flowing commodities (static), particular care shall be taken to ensure that these increments are distributed regularly throughout the grain mass, both at the surface and deep down.

3.3 Precautions shall be taken to ensure that all equipment used is clean, dry and free from foreign odours. The sampling procedures shall be carried out in such a way that the sampled material is protected from any source of accidental contamination caused by rain, dust, etc.

3.4 All the sampling procedures shall be carried out over a sufficiently short period of time to avoid any modification of the volatile substances in the samples. If one of the sampling stages takes a long time, the increments, individually or combined, shall be kept in sealed containers.

3.5 In the event of arbitration, samples shall be taken jointly by representatives of both the purchaser and the vendor, or by a third party nominated by common accord.

3.6 Precautions shall be taken to guarantee the integrity of all samples between the moment they are taken and the moment they are used in the laboratory.

4 Equipment and devices

There are many different types of sampling equipment or devices. The most suitable equipment should be chosen taking into account the product to be sampled, the quantity required and the containers to be used.

Annex A describes the general types of mechanical sampling devices used on flowing grain, and shows illustrations of examples of such devices. Annex B gives examples of instruments used to sample static products, and examples of instruments used to divide samples.

Annex A and B are not exhaustive.

Mechanical sampling devices shall have suitable points of access for the examination, cleaning, maintenance, and repair of all surfaces subject to wear. The points of access should be made of materials which do not generate an electrostatic charge.

For maize, suction sampling devices should have a twin bore tube with an air supply. These suction sampling devices may also be used for other cereals.

5 Sampling

5.1 General

Sampling in bulk concerns both the sampling of flowing cereals and the sampling of static cereals. In both cases, the sample can be taken using mechanical or manual means.

Sampling from packed units (2.7) only concerns static sampling and only uses manual means.

The number of increments and the masses are given in Tables 1 and 2 for grain, in Tables 3 and 4 for milled and other cereal products and in Table 5 for milled and other cereal products in packed units.

One laboratory sample (2.5) is required by lot or sub-lot of 1 500 t maximum.

EXAMPLE For a lot of 6 000 t, analyse at least four laboratory samples.

NOTE The ranges of masses indicated in Tables 1 to 5 come from ISO/TR 29263[9].

5.2 Sampling of bulk products

5.2.1 General

Whenever possible, sampling should be carried out when the products are flowing (e.g. during loading or unloading) so that all the constituent parts of the lot have the same probability of being sampled.

When mechanical means are not available, implement a manual sampling plan.

The methods (mechanical or manual) of taking samples from flowing lots shall be adapted to the speed at which the products are flowing (see Tables 1 and 3). For static grain, whichever method of sampling is used, the increments should be taken at regular intervals over the entire width and depth, up to 9 m. Sample lots of bulk grain which are more than 9 m deep when they are flowing.

For lorries and trailers, it is recommended that samples be taken statically.

In order for the aggregate sample to be representative, the number of increments shall be as high as possible. Tables 1 to 4 specify the minimum numbers of increments to be carried out in different situations.

5.2.2 Sampling of flowing bulk products

5.2.2.1 General. Since the characteristics and make-up of the lot can vary, the increments shall be taken from the whole lot, i.e. as long as the material is flowing.

5.2.2.2 Mechanical sampling. Adjust the equipment so that the size of the increments or the frequency of sampling can be varied over a wide range.

A series of fixed-size increments shall be taken at pre-determined intervals according to the flow and in such a way that each part of the lot has the same chance of entering the sampling device intake.

EXAMPLE Crosscut sampling devices meet this requirement irrespective of the type of flow.

5.2.2.3 Manual sampling. Take increments at regular intervals.

5.2.3 Sampling of static bulk products

For static sampling, the means and methods of taking samples shall take into account the height of the product to be sampled.

Up to a depth of 2 m, manual probes can be used. Up to a depth of 2,5 m, mechanical sampling devices can be used if the principle of sampling according to which they function does not create any segregation at the probe tube intake and does not cause damage to the grains. Otherwise, if the height of the product exceeds 2,5 m, only suction sampling devices shall be used.

Sample lots of bulk grain which are more than 9 m deep when they are flowing.

The lot should be sampled over its entire depth using a grid method (see Figures 1 and 2).

In the current state-of-the-art, the sampling probes used for grain are not correctly adapted to the powdery nature of flours.

5.2.4 Number and mass of samples of grain

5.2.4.1 Number and mass of increments

The number and the mass of the increments are given in Tables 1 and 2. All the increments taken together constitute the aggregate sample which shall be homogenized and divided (6.1 and 6.2) to form the laboratory sample.

5.2.4.2 Mass of laboratory samples

The recommended mass of a laboratory sample is determined by the type and the requirements of the tests that are to be carried out (see Tables 1 and 2).

For analysis of contaminants, the mass of the laboratory sample shall be from 1 kg to 10 kg.

For analysis of other characteristics, it shall be at least 1 kg (3 kg for samples taken with a view to trial milling).

5.2.4.3 Sampling of flowing bulk products by mechanical or manual means

The mechanical sampling device shall be set up so that increments of the size specified in Table 1 below can be obtained. The size of these increments and samples is given for information only and is not intended to replace national specifications or requirements.

Table 1 — Sampling procedure to obtain the minimum mass of laboratory sample for flowing grain

Sampling of flowing grain by mechanical or manual means				
Method	**Range of mass of increment**	**Minimum number of increments**[a]	**Minimum mass of laboratory sample for contaminants**	**Minimum mass of laboratory sample for other analyses**
Mechanical sampling	300 g to 1 900 g	— 20 per lot or sub-lot of 500 t — 25 per lot or sub-lot of 1 500 t for large batches of size greater than 1 500 t	For ochratoxin A and aflatoxins: 10 kg For pesticides, heavy metals, dioxins: 1 kg For other contaminants[b]: 3 kg	1 kg to 3 kg according to analytical requirements
Manual sampling	300 g to 1 900 g	For contaminants: — 20 per lot or sub-lot of 500 t — 25 per lot or sub-lot of 1 500 t for large batches of size greater than 1 500 t For other analyses: — 3 per lot or sub-lot of 500 t — 4 per lot or sub-lot of 1 500 t for large batches of size greater than 1 500 t		

[a] Frequency according to grain flow.

[b] Other contaminants like deoxynivalenol (DON), fumonisins, zearalenone; for the determination of DON, the mass of laboratory sample can be 1 kg.

5.2.4.4 Sampling of static bulk products

The number of samples to be taken for laboratory analysis and arbitration shall be subject to an agreement between the parties concerned.

The number and size of increments can be those indicated in Table 2.

If the mass of the laboratory sample cannot be complied with, the number of increments shall be increased.

Figure 1 shows examples of the distribution of eight sampling points and Figure 2 for 25.

Table 2 — Sampling procedure to obtain the minimum mass of laboratory sample for static grain

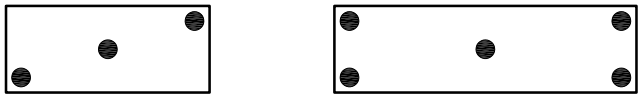
Sampling of static bulk grain (mechanical sampling systems recommended) **in trailers or lorries, wagons, ships or bulk tankers, silos or warehouses**				
Size of lot or sub-lot m	**Range of mass of increment**[a]	**Minimum number of increments**[b]	**Minimum mass of laboratory sample for contaminants**	**Minimum mass of laboratory sample for other analyses**
$m \leqslant 15$ t	400 g to 3 000 g	3 sampling points	For ochratoxin A and aflatoxins: 10 kg For pesticides, heavy metals, dioxins: 1 kg For other contaminants[c]: 3 kg	1 kg to 3 kg according to the analytical requirements
$15 < m \leqslant 30$ t		8 sampling points		
$30 < m \leqslant 45$ t		11 sampling points		
$45 < m \leqslant 100$ t		15 sampling points		
$100 < m \leqslant 300$ t		18 sampling points		
$300 < m \leqslant 500$ t		20 sampling points		
$500 < m \leqslant 1\,500$ t		25 sampling points		
Per lot or sub-lot of 1 500 t		25 sampling points		

[a] If taken mechanically, the mass of the sample can be appropriate to the equipment.

[b] For grain bulks of great depth, a sample taken every 2 m over a sampling height corresponds to one increment. Repeat the procedure as many times as necessary.

[c] Other contaminants like DON, fumonisins, zearalenone; for the determination of DON, the mass of laboratory sample can be 1 kg.

a) For lorries “in one piece” (e.g. dumper truck, semi-trailer)



Chassis **Trailer**

b) For lorries distributed in chassis and trailer

Figure 1 — Examples of the distribution of sampling points for 8 points

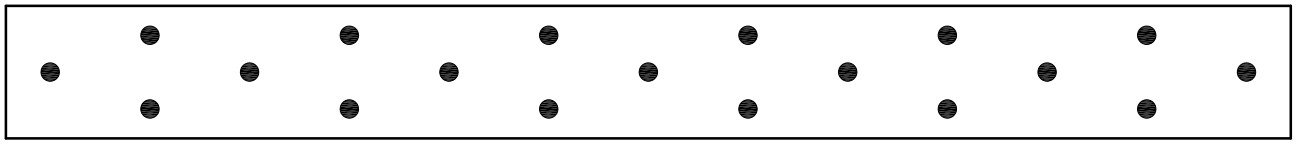


Figure 2 — Examples of the distribution of sampling points for 25 points