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**Cereals, pulses and milled products —  
Sampling of static batches**

*Céréales, légumineuses et produits de mouture — Échantillonnage des lots  
statiques*

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ISO 13690:1999

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## Foreword

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

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

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

International Standard ISO 13690 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*, Subcommittee SC 4, *Cereals and pulses*.

This first edition of ISO 13690 cancels and replaces ISO 950:1979, ISO 951:1979 and ISO 2170:1980.

Annex A forms a normative part of this International Standard. Annexes B and C are for information only.

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## Introduction

Correct sampling is an operation that requires the most careful attention. Emphasis cannot, therefore, be too strongly laid on the necessity of obtaining a properly representative sample of cereals, pulses and milled products. Accurate analytical work and the interpretation of results are wasted if the sample does not accurately represent the lot from which is taken.

The procedures given in this International Standard are recognized as good practice and it is strongly recommended that they be followed whenever practicable. It is recognised that it is difficult to lay down fixed rules to be followed in every case, and particular circumstances may render some modification of the method desirable, for example if it is desired to check the uniformity of a consignment by the examination of individual increments.

In certain areas there are widely recognized trade associations which specify rules for the sampling procedures to be used in contracts under their auspices. In no case will this International Standard override the rules laid down in such contracts.

It is highly desirable that personnel employed in sampling should have been suitably trained.

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# Cereals, pulses and milled products — Sampling of static batches

## 1 Scope

This International Standard specifies general conditions relating to sampling for the assessment of the quality of cereals, pulses and milled products from cereals and pulses (hereinafter called "grain"), in bulk or in bags, but excluding pellets.

It is applicable to the manual or mechanical sampling of static bulk grain up to a depth of 3 m. For static bulks exceeding 3 m in depth up to a maximum depth of 12 m, it is necessary to use mechanical sampling methods. For bulk grain exceeding 12 m in depth it is necessary to sample grain when flowing. This latter sampling method is also applicable for all depths of bulk grain (see ISO 6644).

This International Standard is not applicable to seed grain, nor does it apply to sampling for testing for hidden infestation. It is not applicable to flowing grain.

This International Standard is not applicable for certain sampling requirements (e.g. microbiological, mycotoxin and pesticide residue analysis). In these cases, it is recommended that the parties concerned come to an agreement.

NOTE 1 Sampling of seed grain is covered by rules established by the International Seed Testing Association.

NOTE 2 Sampling for hidden insect infestation is covered by ISO 6639-2.

NOTE 3 ISO 6644 covers sampling of flowing grain. [ISO 13690:1999  
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## 2 Terms and definitions

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

### 2.1 consignment

physical quantity of grain on offer, dispatched or received at one time, and covered by a particular contract or shipping document; it may be composed of one or more lots

NOTE Consignments should be considered in lots not exceeding 500 t.

### 2.2 lot

stated portion of the consignment whose quality is to be assessed

### 2.3 increment

small equal quantity of grain taken from each individual sampling point in the lot, throughout the full depth of the lot

### 2.4 laden

term to describe a partly or completely full state, as for wagon, lorry, barge or ship

NOTE See 6.3.1.

### 2.5 bulk sample

quantity of grain obtained by combining and mixing the increments taken from a specific lot

## 2.6

### laboratory sample

quantity of grain removed from the bulk sample and intended for analysis or other examination

## 3 General principles

**3.1** Samples should be taken jointly by representatives of the buyer and seller or by a sampling superintendent appointed jointly.

**3.2** Samples shall be as representative as possible of the lots from which they are taken. Therefore, as the composition of a lot is seldom uniform, a sufficient number of increments shall be taken and carefully mixed, thus giving a bulk sample from which the laboratory samples (see 8.3) are obtained by successive divisions or otherwise.

NOTE A sampling scheme for consignments of more than 100 bags is given in annex A.

**3.3** It is normal practice that grain which is sea-damaged or otherwise damaged in transit, or is out of condition, is kept separate from the sound grain and is sampled separately. Samples of unsound material shall not be mixed with samples of sound material and shall be identified and quantified (see clause 11).

**3.4** Special care is necessary to ensure that all sampling apparatus is clean, dry and free from foreign odours.

**3.5** Sampling shall be carried out in such a manner as to protect the samples, sampling instruments, and the containers in which the samples are placed, from contamination from rain, dust, etc. If walking on grain cannot be avoided, precautions in the form of protective clothing should be taken to prevent contamination of the grain.

## 4 Instruments

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### 4.1 General

Many different types of instrument are available. Those given in annex B and their dimensions are included, therefore, solely as a guide. Annex C is included to help in the selection of suitable sampling instruments. It is known that use of the various types of equipment can give rise to differing samples from the same lot.

Where possible, the type of equipment to be used and the procedures for its use shall be determined by agreement between the parties concerned.

The instruments listed in 4.2 to 4.4 are in general usage.

Pneumatic samplers should not be used for milled products.

All instruments used shall be suitable for the product being sampled.

### 4.2 Sampling from bulk

Use appropriate apparatus for obtaining increments from static bulk (e.g. hand-held spears, mechanical or air-assisted apparatus).

### 4.3 Sampling from bags

Use sack-type spears.

### 4.4 Mixing and dividing

Use shovels and dividing apparatus or automatic random dividing apparatus.

## 5 Location and time of sampling

The location and time of sampling shall be determined by agreement between the parties concerned.

## 6 Method of taking samples

### 6.1 General

Unless otherwise specified in the contract, consignments shall be considered in lots of a maximum of 500 t or such part thereof as constitutes a single consignment.

### 6.2 Sampling from bags

**6.2.1** Unless otherwise specified in the contract or unless the practice at the port or elsewhere requires otherwise, increments shall be taken from different parts of a bag (for example top, middle and bottom) by means of a sack/bag spear from the number of bags specified in Table 1.

**Table 1 — Number of bags to be sampled**

Number of bags in consignment	Number of bags to be sampled
Up to 10	Each bag
10 to 100	10, taken at random
More than 100	Square root (approx.) of total number, taken according to a suitable sampling scheme <sup>a</sup>
<sup>a</sup> See annex A.	

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**6.2.2** Prepacked units are usually transported in outer cases or cartons containing a convenient number of units. The procedure applicable to bags (described in 6.2.1) shall be used to determine the appropriate number of outer cases or cartons to be sampled. If the total number of outer cases or cartons in the consignments does not exceed 1000, only one prepacked unit shall be taken from each of the outer cases taken for sampling.

**6.2.3** Care shall be taken to ensure that a prepacked unit is taken in a random manner from the entire contents of the outer case or carton for sampling.

The selection of prepacked units occupying the same corresponding position in a number of outer cases or cartons shall be avoided.

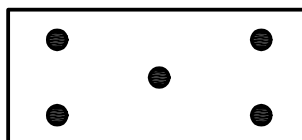
The prepacked units taken in this manner shall be considered as increments.

### 6.3 Sampling from rail or road wagons, lorries, barges or ships

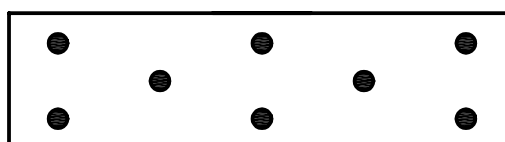
**6.3.1** Unless otherwise specified in the contract, each laden wagon, lorry, barge or ship shall be sampled.

**6.3.2** Increments shall be taken throughout the whole depth of the lot. Suggested patterns are as follows.

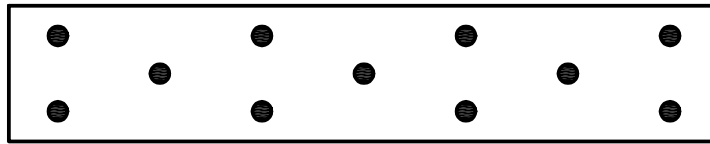
a) Up to 15 t: 5 sampling points



b) From 15 t to 30 t: 8 sampling points



c) From 30 t to 500 t: minimum of 11 sampling points



d) Above 500 t: see Table 2

When using mechanical samplers, increments shall be taken from a minimum of three different sampling points.

6.3.3 If the type of wagon, vessel or commodity does not allow samples to be taken in this manner, or if there is a separate agreement between the buyer and seller, the grains shall be sampled during discharge of the wagon/vessel.

**6.4 Sampling from silos, bins or warehouses**

6.4.1 Increments shall be taken throughout the whole depth of the lot. A suitable instrument must be used to achieve this requirement. If the depth of the lot does not permit use of this method, sampling should be carried out from the flowing cereal in accordance with ISO 6644.

6.4.2 The grain should be sampled using a grid system, for example similar to that used for rail/road wagons, barges or ships (6.3.2).

6.4.3 Sufficient increments should be taken to satisfy the requirements given in 6.4.4.

6.4.4 The number of increments to be taken shall be determined as follows.

Take the square root of the tonnage in the static bulk. Divide by two and round up to the next whole number. This is the minimum number of increments that is to be obtained. If circumstances dictate that more increments are required to obtain fair average samples of the static bulk, then more shall be taken. They shall be obtained from samples taken randomly from different positions in the bulk. For examples, see Table 2.

**Table 2 — Number of increments for bulk grain of more than 500 t**

Tonnage	Square root	Number of increments
500	22,4	12
1 000	31,6	16
2 000	44,7	23
4 000	63,2	32
6 000	77,4	39
8 000	89,4	45
10 000	100	50

**7 Bulk sample**

The bulk sample shall be formed by combining the increments and mixing them thoroughly.

**8 Laboratory sample**

**8.1 Division of bulk sample**

Divide the bulk sample to obtain the required number of laboratory samples by coning and quartering or by using one of the sample dividers described in 8.1.2.1 to 8.1.2.3.



### 8.1.1 Coning and quartering

Mix the sample thoroughly on a clean non-absorbent surface. Draw the grain into a conical heap. Flatten the top of the heap and divide into quarters.

Reject the two diagonally opposite quarters (B and C) and mix the remaining two (A and D). See Figure 1.

Repeat the complete process until the required laboratory sample is obtained.

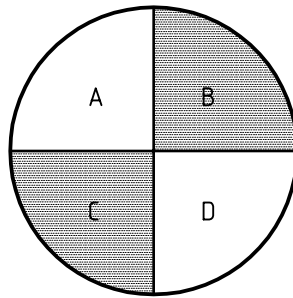


Figure 1 — Coning and quartering

### 8.1.2 Sample dividers

#### 8.1.2.1 Multiple-slot (Riffle-type and blade) divider

Pour the bulk sample along the length of the hopper. Two equal sub-samples are separated in the two bottom troughs. Discard the sample from one trough. Repeat this procedure as many times as is necessary to obtain the required laboratory sample.

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#### 8.1.2.2 Conical divider

- Pour the bulk sample into the hopper.
- Two equal sub-samples are separated in the bottom receptacles.
- Discard the sample from one receptacle.
- Remove and save the second full receptacle.
- Replace these with two empty receptacles.
- Pour the contents of the saved full receptacle into the hopper.

Repeat procedures b) to f) as many times as is necessary to obtain the required laboratory sample.

#### 8.1.2.3 Centrifugal divider

Activate the divider. Pour the bulk sample into the top hopper. Laboratory samples are collected in removable receptacles.

## 8.2 Number of samples

The number of laboratory samples to be taken for analysis and arbitration shall be specified in the contract or otherwise agreed between the parties concerned.

### 8.3 Size of sample

The size of the laboratory samples will be determined by the type and requirements of the tests to be undertaken. Generally it is a minimum of 1 kg (3 kg for milled products).

## 9 Packaging and labelling of samples

### 9.1 Packaging of samples

**9.1.1** The laboratory samples shall be packed in containers suitable for the purpose, bearing in mind the tests to be undertaken.

**9.1.2** Samples for the determination of moisture content, or for other tests in which it is important to avoid the loss of volatile matter (for example, examination for evidence of chemical treatment), shall be packed in moisture-tight containers and stored appropriately. The containers shall be completely filled and the closures shall be sealed to prevent loosening or tampering.

**9.1.3** The bags and other containers shall carry the seal of each sampler.

### 9.2 Labels for samples

**9.2.1** If paper labels are used for the samples, they shall be of a suitably high quality for the purpose. If there are eyelet holes on the labels, these shall be reinforced.

If the grain has a high moisture content, then special moisture-resistant labels shall be used.

A duplicate label may be included in the sample container provided that the sample is not intended for the determination of moisture content or the content of some other ingredients. If the inside label could modify the result of these determinations, the label should be fixed or glued on the outer part of the container. The information may also be written directly on the bags containing the samples.

The information, written on the labels or directly on the bags, shall be indelibly marked, using a marker which will not cause any odour in the sample.

**9.2.2** The information shall include such of the following items as are required by the terms of the contract:

- a) origin of the product;
- b) identification number of ship, wagon or lorry;
- c) point of departure;
- d) date and point of receipt (if applicable);
- e) destination;
- f) date of arrival at the destination;
- g) quantity of consignment;
- h) bulk, or bagged (including number of bags);
- i) type of goods;
- j) identification mark or lot number;
- k) name of seller;
- l) name of receiver (if applicable);
- m) name of buyer;

- n) contract number and date;
- o) date of sampling;
- p) date of final discharge;
- q) place and point of sampling;
- r) type of sampling apparatus;
- s) name of person who carried out sampling;
- t) reason for sampling;
- u) number of duplicate samples taken.

## 10 Dispatch of samples

Laboratory samples shall be dispatched as soon as possible, or at time to be fixed in the contract. Whenever possible, samples should be kept and transported at a temperature below 15 °C, out of direct sunlight and in a non-humid location.

## 11 Sampling report

If a sampling report is prepared, besides giving the usual information it shall make reference to the condition of the grain sampled, including signs of insect, mite or rodent infestation visible at the time of sampling in the warehouse or silo, or during work carried out on the vessel or other carrier during sampling.

The report shall also refer to the sampling technique used, if this is other than described in this International Standard, and all circumstances that may have influenced sampling.

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## 12 Health and safety

When operating in a potentially dusty environment, a suitable respirator shall be worn. It is essential to wear gloves and to wash hands after sampling crops which may have been treated with chemicals.

**WARNING: It is hazardous to walk on grain stored in bins, ships' holds, silos and lorries, and local regulations and legislation, and industry safety standards, shall be adhered to.**

**In certain cases the atmosphere in silos can be asphyxiating or toxic due to the build-up of gases from grain and fungal metabolism.**