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Cereals and cereal products — Sampling

Céréales et produits céréaliers — Échantillonnage

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Foreword

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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.

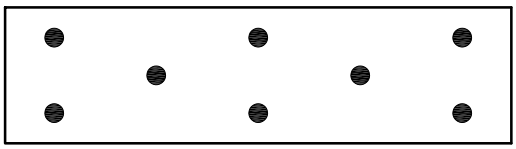
Table 2 — Sampling procedure to obtain the minimum mass of laboratory sample for static grain

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		

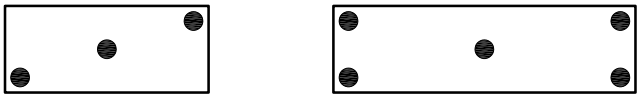
[a] If taken mechanically, the mass of the sample can be appropriate to the equipment.

[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

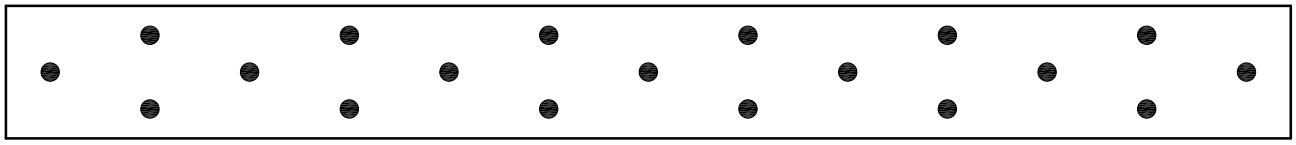


Figure 2 — Examples of the distribution of sampling points for 25 points

5.2.5 Number and mass of samples of milled and other cereal products

See Tables 3 and 4.

Table 3 — Sampling procedure to obtain the minimum mass of laboratory sample for flowing milled and other cereal products

Sampling of flowing milled and other cereal products by mechanical or manual means				
Method	**Indicative mass of increment**	**Minimum number of increments**	**Minimum mass of laboratory sample for contaminants**	**Minimum mass of laboratory sample for other analyses**
Mechanical sampling	300 g to 1 900 g	15 per lot or sub-lot of 100 t (frequency according to flow)	For powdery products: 1 kg For agglomerated products (e.g.: pellets…): 3 kg	1 kg to 3 kg according to the analytical requirements
Manual sampling	300 g to 1 900 g	15 per lot or sub-lot of 100 t: i.e. for a flow $\leqslant$ 20 t/h, minimum of 3 per hour i.e. for a flow $>$ 20 t/h, minimum of 3 per 20 t		
NOTE 1 Additional increments may be required to reach the minimum mass of laboratory sample. NOTE 2 As it is assumed that powdery products are more homogeneous than grains, a laboratory sample of 1 kg is sufficient for contaminant analysis.				

Table 4 — Sampling procedure to obtain the minimum mass of laboratory sample for static milled and other cereal products

Sampling of static bulk milled and other cereal products (mechanical sampling systems recommended) **in trailers or lorries, wagons**				
Size of sub-lot or lot m	**Indicative mass of increment**	**Minimum number of increments**	**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 powdery products: 1 kg For agglomerated products (e.g.: pellets…): 3 kg	1 kg to 3 kg according to the analytical requirements
15 < $m \leqslant$ 30 t		3 sampling points per compartment		
30 < $m \leqslant$ 45 t		5 sampling points per compartment		
$m >$ 45 t		8 sampling points per compartment		
NOTE 1 Additional increment may be required to reach the minimum mass of laboratory sample. NOTE 2 As it is assumed that powdery products are more homogeneous than grains, a laboratory sample of 1 kg is sufficient for contaminant analysis.				

It is recommended to sample milled and other cereal products when flowing, during manufacturing or upon shipment. The sampling in silos is not recommended.

5.3 Sampling of milled and other cereal products in packed units

5.3.1 "Crates boxes" or sacks and bags to be sampled

A lot is constituted by a group of basic units ("packed unit") which originate from one or several sources of manufacture which have the same traceability identification code on the individual packaging.

The packed units are generally transported in crates boxes or pallets which contain an appropriate number of basic units. The method applicable to sacks (see 5.3.3) shall be used to define the appropriate number of crates boxes or pallets that are to be sampled.

5.3.2 Increments or packed units

The packed unit shall be the increment sampled at random from the overall contents of the lot selected for sampling.

IMPORTANT — Avoid selecting packed units which occupy the same position in several crates boxes or pallets.

5.3.3 Number and mass of increments

The increments shall be taken from the centre and over the whole length of each packed unit to be sampled using a tapered sampling probe specially designed for sacks (see B.1.2). They shall be taken from the number of sacks specified below.

The following equation shall be used as a guide for determining the frequency of sampling per lot, $F(n)$, for lots marketed in individual packages (sacks, retail packages, etc.).

Take an incremental sample from every nth sack or bag (decimal figures should be rounded to the nearest whole number), where n is the number of packed units between two increments.

$$F(n) = \frac{m_B \; m_I}{m_A \; m_P}$$

where

m_B is the mass, in kilograms, of the lot;

m_I is the mass, in kilograms, of the increments (approximately 0,100 kg);

m_A is the mass, in kilograms, of the aggregate sample;

NOTE For analyses of contaminants, m_A is approximately 1 kg for powdery products and 3 kg for agglomerated products (e.g. pellets), and 1 kg to 3 kg for other analyses.

m_P is the mass, in kilograms, of the individual package.

The frequency of sampling per lot calculated with a mass of increment of 0,100 kg corresponds to a minimum number of increments to be taken. If the mass of the increment is greater than 0,100 kg, the frequency of sampling calculated with 0,100 kg shall be applied.

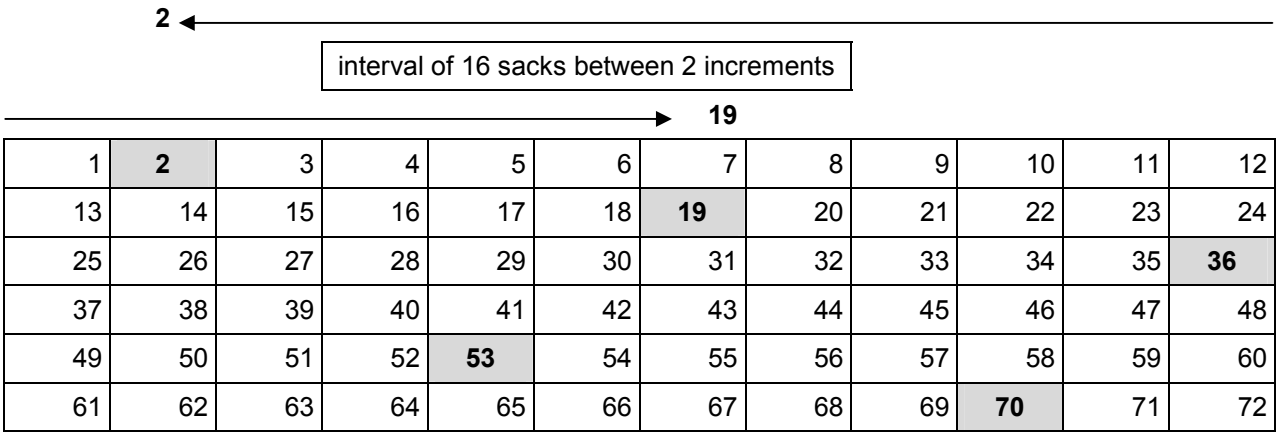
Practical examples of a calculated frequency of sampling for lots of 25 t, 50 t and 100 t are given in Table 5 and Figure 3.

Table 5 — Sampling procedure to obtain the minimum mass of laboratory sample for milled and other cereal products in packed units: practical examples for lots of 25, 50 and 100 tonnes and an average mass of 800 kg per pallet

Lot size	Mass of individual sacks	Mass of increment	Calculated frequency of sampling for contaminant analysis on agglomerated product	Equivalent per pallet	Calculated frequency of sampling for contaminants analysis on powdered products or for other analyses on any type of product	Equivalent per pallet
kg	kg	kg	1 increment every nth packed unit	1 sample shall be all n bags, or 1 sample shall be all x pallets	1 increment every nth packed unit	1 sample shall be all n bags, or 1 sample shall be all x pallets
25 000	1	0,100	833	1 sample every 833 packed unit, or 1 sample per pallet	2 500	1 sample every 2 500 packed unit, or 1 sample every 3 pallets
25 000	5	0,100	167	1 sample every 167 packed unit, or 1 sample per pallet	500	1 sample every 500 packed unit, or 1 sample every 3 pallets
25 000	25	0,100	33	1 sample every 33 packed unit, or 1 sample per pallet	100	1 sample every 100 packed unit, or 1 sample every 3 pallets
25 000	40	0,100	21	1 sample every 21 packed unit, or 1 sample per pallet	63	1 sample every 63 packed unit, or 1 sample every 3 pallets
25 000	50	0,100	17	1 sample every 17 packed unit, or 1 sample per pallet	50	1 sample every 50 packed unit, or 1 sample every 3 pallets
50 000	1	0,100	1 667	1 sample every 1 667 packed unit, or 1 sample every 2 pallets	5 000	1 sample every 5 000 packed unit, or 1 sample every 6 pallets
50 000	5	0,100	333	1 sample every 333 packed unit, or 1 sample every 2 pallets	1 000	1 sample every 1 000 packed unit, or 1 sample every 6 pallets
50 000	25	0,100	67	1 sample every 67 packed unit, or 1 sample every 2 pallets	200	1 sample every 200 packed unit, or 1 sample every 6 pallets
50 000	40	0,100	42	1 sample every 42 packed unit, or 1 sample every 2 pallets	125	1 sample every 125 packed unit, or 1 sample every 6 pallets
50 000	50	0,100	33	1 sample every 33 packed unit, or 1 sample every 2 pallets	100	1 sample every 100 packed unit, or 1 sample every 6 pallets

Table 5 (*continued*)

Lot size	Mass of individual sacks	Mass of increment	Calculated frequency of sampling for contaminants analysis on agglomerated products	Equivalent per pallet	Calculated frequency of sampling for contaminants analysis on powdered products or for other analyses on any type of product	Equivalent per pallet
kg	kg	kg	1 increment every nth packed unit	1 sample shall be all n bags, or 1 sample shall be all x pallets	1 increment every nth packed unit	1 sample shall be all n bags, or 1 sample shall be all x pallets
100 000	1	0,100	3 333	1 sample every 3 333 packed unit, or 1 sample every 4 pallets	10 000	1 sample every 10 000 packed unit, or 1 sample every 12 pallets
100 000	5	0,100	667	1 sample every 667 packed unit, or 1 sample every 4 pallets	2 000	1 sample every 2 000 packed unit, or 1 sample every 12 pallets
100 000	25	0,100	133	1 sample every 133 packed unit, or 1 sample every 4 pallets	400	1 sample every 400 packed unit, or 1 sample every 12 pallets
100 000	40	0,100	83	1 sample every 83 packed unit, or 1 sample every 4 pallets	250	1 sample every 250 packed unit, or 1 sample every 12 pallets
100 000	50	0,100	67	1 sample every 67 packed unit, or 1 sample every 4 pallets	200	1 sample every 200 packed unit, or 1 sample every 12 pallets



1	**2**	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	**19**	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	**36**
37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	**53**	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	**70**	71	72

Figure 3 — Examples of the distribution of sampling points for a frequency of sampling $F(n)$ of 17

6 Laboratory sample

6.1 Homogenization

The aggregate sample shall be thoroughly homogenized prior to any division procedure intended to obtain the laboratory sample.

NOTE Division without prior homogenizing results in unrepresentative laboratory samples.

6.2 Division of the aggregate sample

Reduce the aggregate sample to obtain the required number of laboratory samples of specified mass (see Tables 1 to 4) by using a method and equipment that will give representative laboratory samples. Examples are given in 6.2.1, 6.2.2 and Clause B.3. Alternative equipment may be used when handling very large aggregate samples, but it shall be capable of producing representative laboratory samples.

The equipment has to be thoroughly cleaned between each sample to avoid cross-contamination.

6.2.1 Coning and quartering method

6.2.1.1 Thoroughly mix the aggregate sample by repeating operations 6.2.1.2 and 6.2.1.3 at least twice before dividing as described in operations 6.2.1.3 and 6.2.1.4. Work on a clean, non-absorbent surface.

6.2.1.2 Gather the grains together into a cone-shaped pile.

6.2.1.3 Flatten out the surface of the pile and then divide the pile into quarters, A, B, C, and D.

6.2.1.4 Discard two diagonally opposed quarters (B and C) and mix the two remaining quarters (A and D) (see Figure 4).

6.2.1.5 Repeat the whole process until the laboratory sample of the required size is obtained.

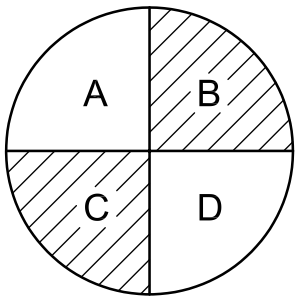


Figure 4 — Coning and quartering method

6.2.2 Sample dividers

Use the divider on a flat surface.

6.2.2.1 Cone-shaped divider

6.2.2.1.1 To reduce an aggregate sample, use an apparatus with a stand if necessary, and use collection boxes or buckets.

6.2.2.1.2 Homogenize the sample by repeating operations 6.2.2.1.3 and 6.2.2.1.4 at least three times and by remixing the subsamples in the hopper.

6.2.2.1.3 Pour the aggregate sample into the closed hopper.

6.2.2.1.4 Two sub-samples are obtained in the two collection boxes (or buckets).

6.2.2.1.5 Keep the contents of one of the two collection boxes.

6.2.2.1.6 Put two empty collection boxes back in position.

6.2.2.1.7 Repeat operations 6.2.2.1.2 to 6.2.2.1.6 as many times as necessary using the sub-sample from 6.2.2.1.5, alternating the collection boxes to be kept until the laboratory sample of the required size is obtained.

6.2.2.2 Rotary mechanical divider

Switch on the centrifugal divider. Pour the aggregate sample into the upper hopper. Proceed as in 6.2.2.1.4 to 6.2.2.1.6. Repeat operations 6.2.2.1.2 to 6.2.2.1.6 as many times as necessary, alternating the collection boxes until the laboratory sample of the required size is obtained.

6.2.2.3 Riffle divider

Riffle dividers shall only be used for small samples (less than 2 kg).

Proceed as in 6.2.2.1.4 to 6.2.2.1.6. Repeat operations 6.2.2.1.2 to 6.2.2.1.6 as many times as necessary, alternating the collection boxes until the laboratory sample of the required size is obtained.

7 Packaging and labelling of samples

7.1 General

Laboratory samples shall be placed in clean containers. The containers shall be suitable for the masses of the laboratory samples. The masses shall be appropriate for all the analyses that are to be carried out. The containers shall also preserve the initial characteristics of laboratory samples.

Ideally these containers shall be completely full and shall be sealed to avoid any change in their contents. If present, seals shall be tamper-proof and identifiable.

7.2 Labels for samples

The information listed against a) to g) below shall be marked indelibly and legibly. The information on the labels on the laboratory sample shall include the instructions required under the terms of the contract, for example:

a) the nature of the product;

b) the mass represented;

c) the lot identifier;

d) the contract number (if necessary);

e) the sampling date;

f) the location and point of sampling;

g) the name of the person who carried out the sampling.

8 Shipment of samples

Samples should be sent to the laboratory as quickly as possible.

The samples should be stored and transported in conditions appropriate to the preservation of their integrity.

9 Sampling report

The sampling report may contain some or all of the following information:

a) the date of sampling;

b) the name and signature of the persons authorized to carry out sampling;

c) if necessary:

   1) the name and signature of the seller,

   2) the name and signature of the buyer,

   3) the name and signature of the deliverer;

d) the description of the product, including:

   1) sample reference,

   2) sample mass,

   3) lot size,

   4) sample origin (e.g. flat silo, vertical silo, lorry);

e) the description of the sampling operation, including:

   1) the location and point of sampling,

   2) the number of increments per lot,

   3) the number of laboratory samples per lot,

   4) the sampling procedure used (equipment, static/flowing, etc.),

   5) the destination of the sample, e.g. the name and address to which the samples are to be shipped,

   6) comments if any;

f) the transportation and storage conditions.

10 Hygiene and safety

The sampling device used shall comply with applicable safety requirements and, in particular, have sufficient lighting for inspection, manoeuvring and maintenance. A suitable mask should be worn if the device is used in a potentially dusty environment.

WARNING — Walking on grain stored in storage bins, ships' holds, silos and lorries is dangerous. In some cases, the atmosphere in silos may be asphyxiating or toxic as a result of the accumulation of gas caused by the metabolism of the grain and fungi/mould. Local legislation and industrial safety standards shall be observed.

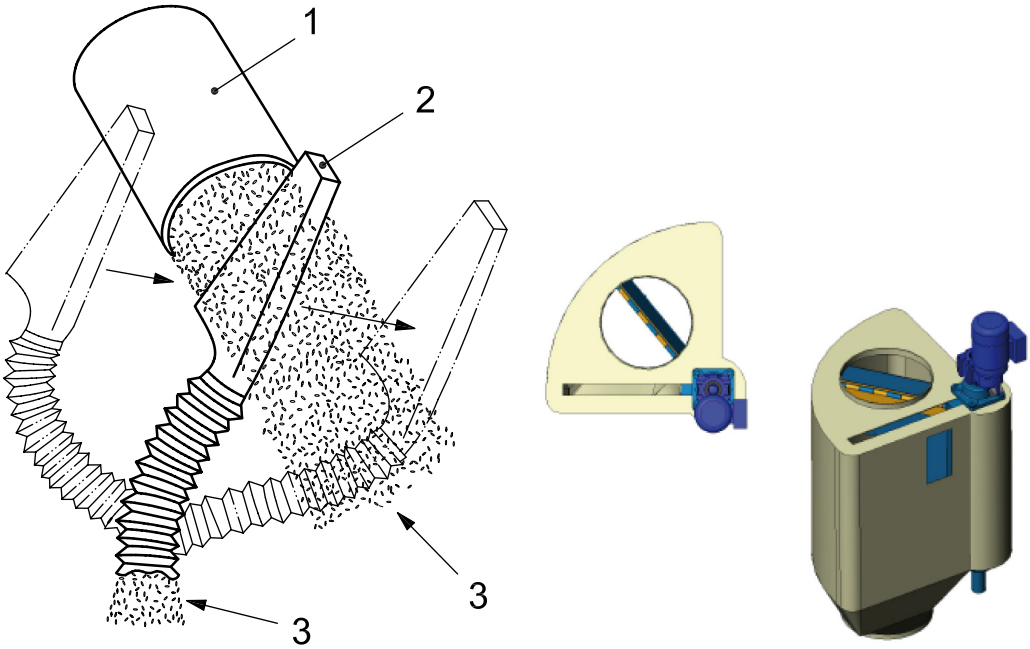
Annex A
(informative)

Examples of mechanical sampling devices used on flowing grain

This annex describes the general types of mechanical sampling devices used on flowing grain, and provides illustrations of examples of such devices.

A.1 Crosscut sampling devices

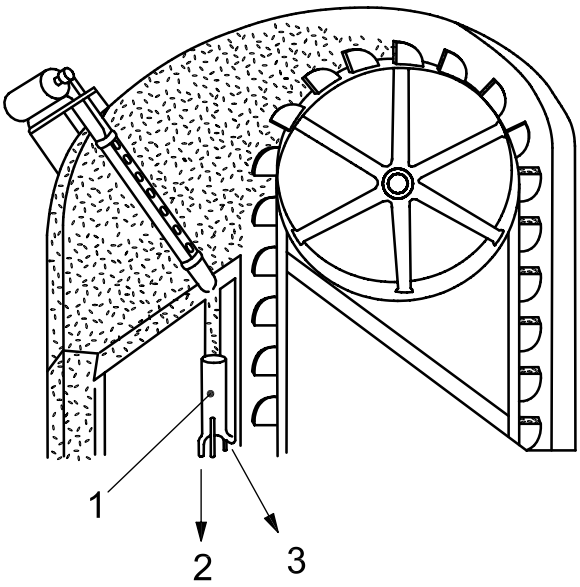
Crosscut sampling devices allow a complete cross-section of a freely falling flow of grains to be taken. They may be open-nozzle sampling devices (see Figure A.1), tubular sampling devices with adjustable apertures (see Figure A.2) or tubular sampling devices with a worm screw (see Figure A.3).



Key

1 nozzle
2 sampling device
3 grain

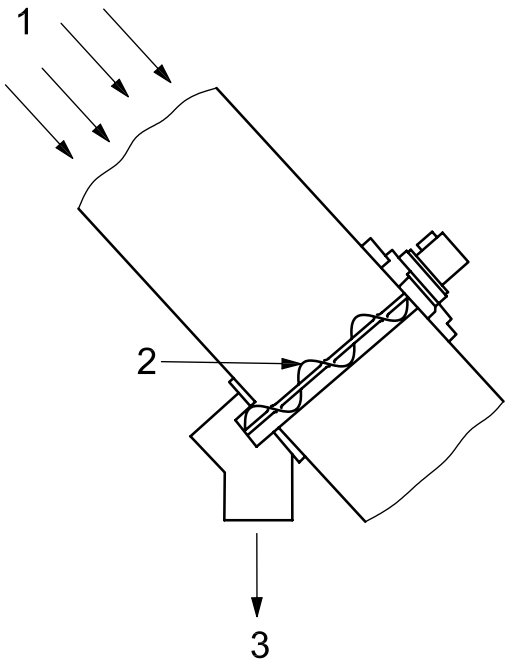
Figure A.1 — Open-nozzle crosscut sampling device, ensuring intermittent, repeated sampling



Key

1 sample divider
2 sample flow
3 return of excess grains into system

Figure A.2 — Tubular crosscut sampling device with adjustable apertures



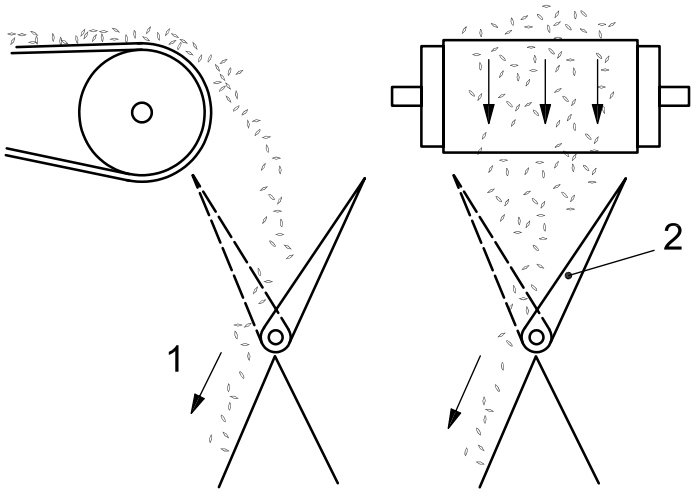
Key

1 grain flow
2 worm screw
3 sample flow

Figure A.3 — Tubular sampling device with worm screw

A.2 Full-flow diverter-type sampling devices

In this type of sampling device, a flap or shutter intermittently diverts the flow of grain (see Figure A.4).



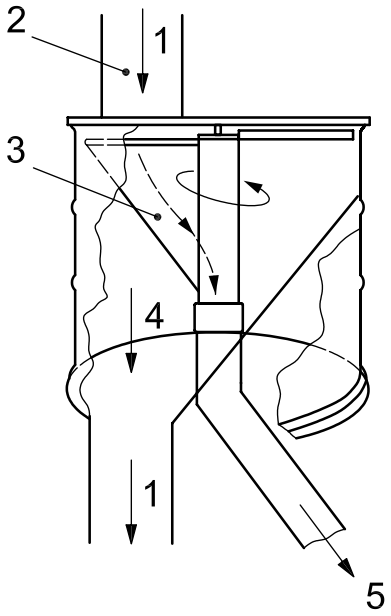
Key

1 sample flow
2 flap or shutter

Figure A.4 — Full-flow diverter-type sampling device

A.3 Rotating cup sampling devices

The freely falling flow of grain is intermittently sampled by a cup which rotates around a central vertical axis (see Figure A.5).



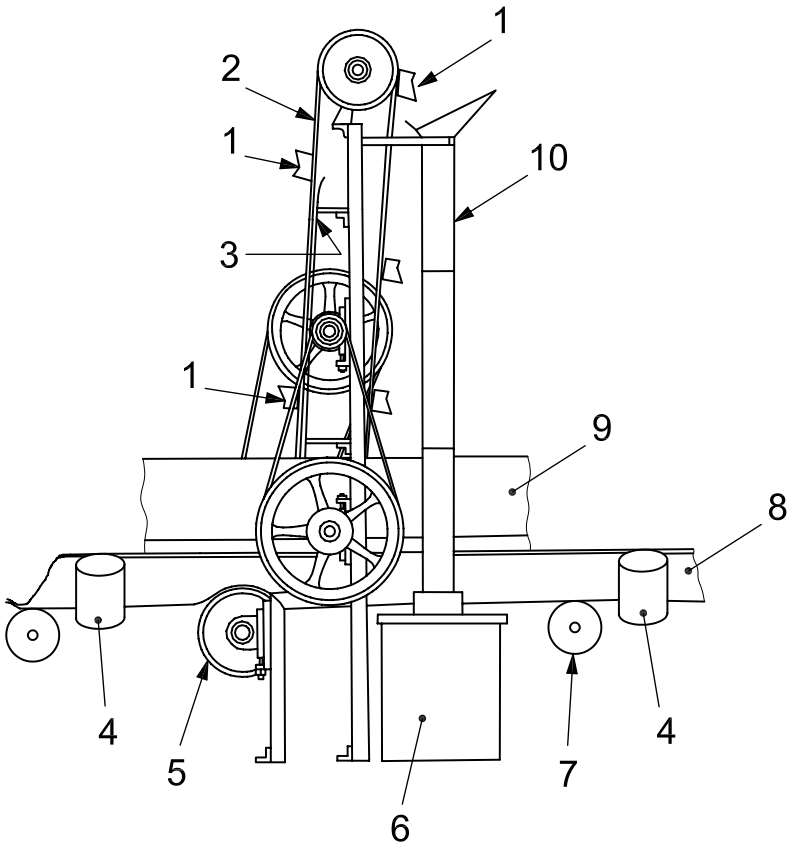
Key

1 grain flow
2 vertical chute
3 rotating cup
4 flow
5 sample flow

Figure A.5 — Rotating cup sampling device

A.4 Bucket elevator sampling devices

This type of sampling device samples grain from a moving belt or conveyor. Buckets travelling in a continuous loop take samples over the entire width of the grain flow because the configuration of the lateral rollers concentrates the grain on the belt. Once the buckets have pivoted around the upper roller, the samples are delivered into the hopper (see Figure A.6).



Key

1 sampling bucket(s)
2 sampling bucket belt
3 belt guide
4 balance weight
5 special roller
6 samples container
7 conveyor roller
8 carrier belt
9 safety panel
10 hopper

NOTE As they are elevated, the buckets sample the grain from a belt or conveyor and, once they have pivoted around the upper roller, deliver the samples into the hopper.

Figure A.6 — Bucket elevator sampling device

Annex B
(informative)

Examples of instruments used to sample static products and instruments used to divide samples

This annex gives examples of instruments used to sample static products and instruments used to divide samples.

B.1 Cereal sampling instruments

B.1.1 Instruments used to sample static bulk products in tote bags and rigid containers

B.1.1.1 Manual concentric tapered sampling probes

B.1.1.1.1 Open or closed shaft: with one or several apertures. See Figures B.1 and B.2.

Figure B.1 — Open shaft with single aperture

Figure B.2 — Open shaft with several apertures or closed shaft with compartments and several apertures

B.1.1.1.2 Open shaft with sequentially staggered apertures: several apertures. See Figure B.3.

Figure B.3 — Open shaft with several sequentially staggered apertures

B.1.1.2 Gravity-type sampling probes with extension rods and T-shaped handles

B.1.1.2.1 Gravity-type sampling probe: concentric. See Figure B.4.

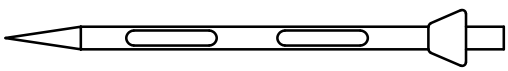


Figure B.4 — Concentric gravity-type tapered probe head

B.1.1.2.2 Gravity-type sampling probe: cup-type. See Figure B.5.

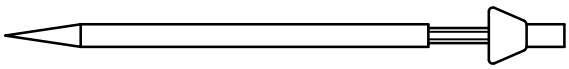


Figure B.5 — Cup-type (head represented in open position)

B.1.1.3 Mechanical sampling devices

B.1.1.3.1 There are three main categories of mechanical sampling devices (see B.1.1.3.2 to B.1.1.3.4).

B.1.1.3.2 Gravity-type sampling device. See Figure B.6.

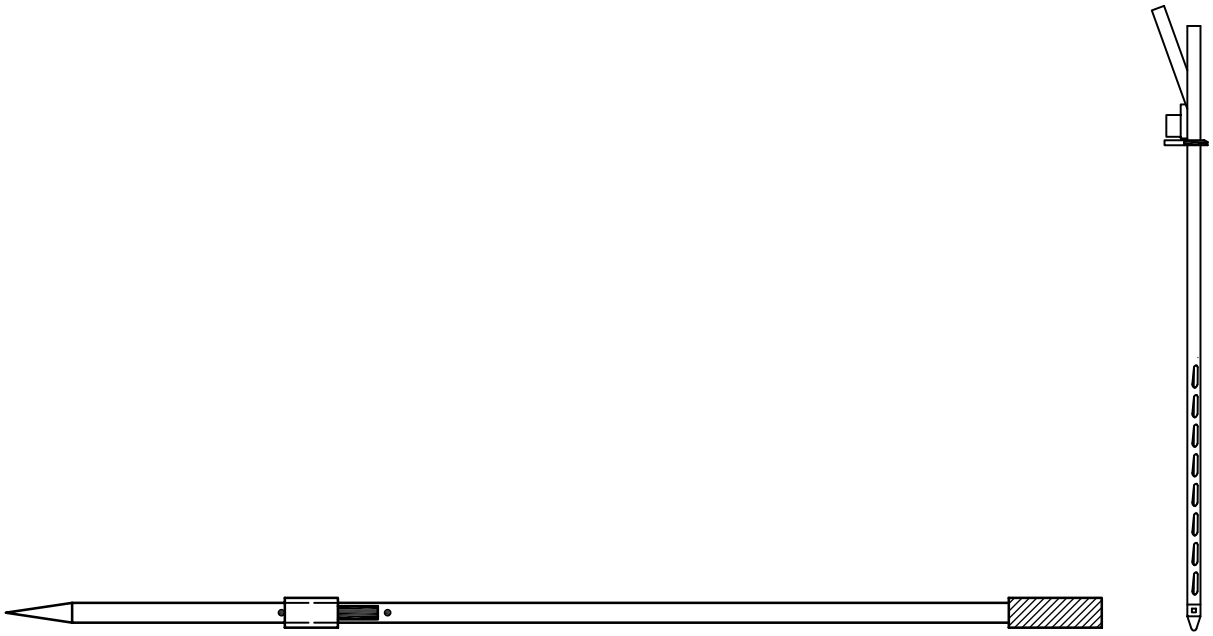
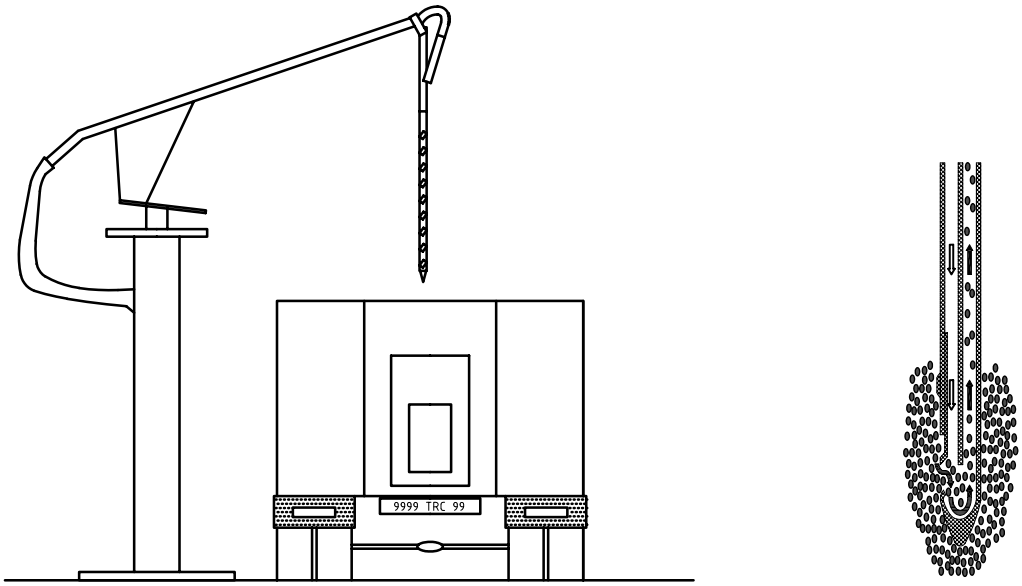


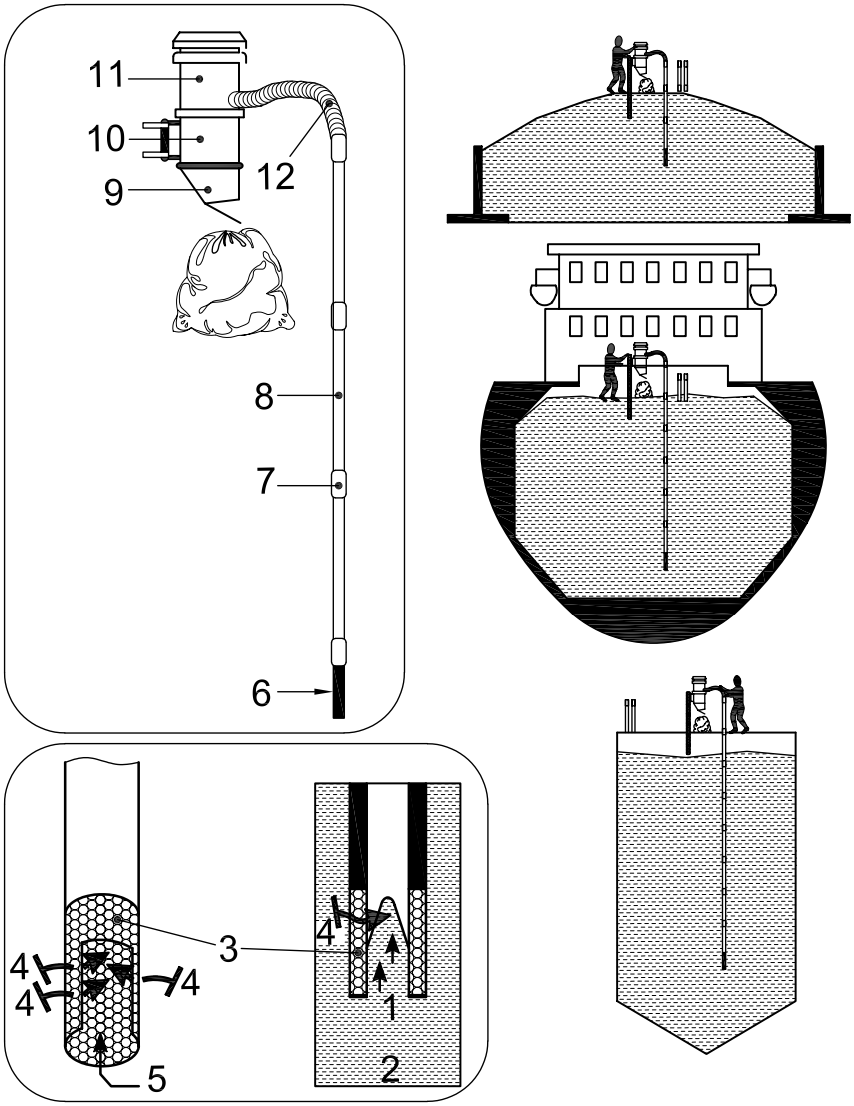
Figure B.6 — Gravity-type sampling device

B.1.1.3.3 Suction sampling device (sometimes called “vacuum sampling device”). See Figure B.7.



a) Example of sampling from a lorry

Figure B.7 (*continued*)



b) Example of sampling at depth over 2 m (ships, bulk tankers, etc.)

Key

1 sample
2 grain mass
3 porous head unit
4 air
5 grain sample
6 sampling head unit
7 coupling
8 extra sampling length
9 automatic discharge of collected sample
10 tank for collected sample
11 vacuum chamber
12 duct

Figure B.7 — Suction (or "vacuum") sampling device

B.1.1.3.4 Pneumatic sampling device (not represented)

B.1.2 Instruments used to take samples from sacks or bags including bulk sacks

B.1.2.1 Tapered sampling probes for sacks

Minimum diameter: 17 mm; aperture: 40 mm × 15 mm. See Figure B.8.

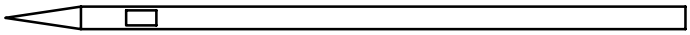


Figure B.8 — Tapered sampling probe for sacks

B.1.2.2 "Walking stick"-type sampling probe

Concentric tubes, minimum diameter: 20 mm:

a) Open shaft: with one or several apertures;

b) With compartments: with one or several apertures (see Figure B.9).

Figure B.9 — "Walking stick"-type, concentric sampling probe for sacks: open shaft with several compartments

B.1.2.3 Cone-shaped sampling device

See Figure B.10.

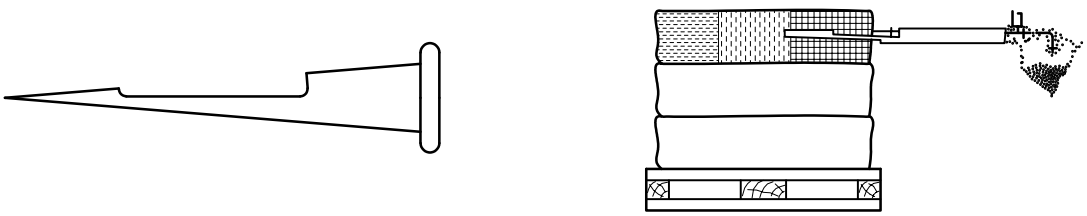


Figure B.10 — Cone-shaped sampling device

B.1.2.4 Gravity-type sampling probes with extension rods and T-shaped handles for open-topped sacks

See Figures B.4 and B.5.

B.1.2.5 Archimedes' screw sampling probe

Generally a small, portable, electric sampling probe. See Figure B.11.

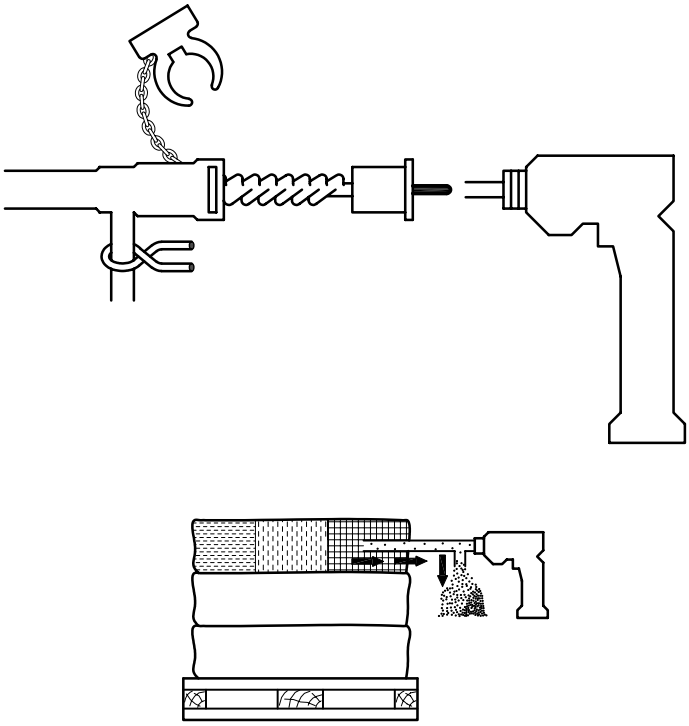


Figure B.11 — Archimedes' screw sampling probe (portable)

B.2 Instruments used to sample milled products, excluding products in granular form

B.2.1 Instruments used to sample static bulk products

B.2.1.1 Identical to those used to sample cereals (B.1.1), except for mechanical sampling devices.

Only two types of mechanical sampling device are suitable for the sampling of milled products (see B.2.1.2 and B.2.1.3). In general, pneumatic sampling devices are not suitable for this usage.

B.2.1.2 Electromechanical Archimedes' screw sampling probe (Figure B.12).

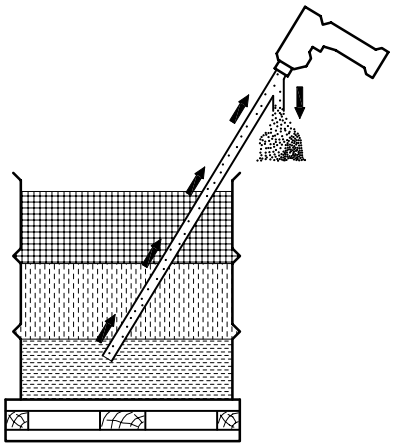


Figure B.12 — Electromechanical Archimedes' screw sampling probe

B.2.1.3 Gravity-type mechanical sampling device (Figure B.6).

B.2.2 Instruments used to take samples from sacks and bags

Identical to those used to sample cereals (B.1.2).

B.3 Instruments used to divide samples

Made of materials which are not liable to contaminate samples.

B.3.1 Quartering irons

See Figure B.13.

B.3.2 Multiple-slot dividers (with partitions and plates)

B.3.2.1 Small laboratory dividers for milled samples.

Minimum of 12 slots; chutes of: 12,7 mm. See Figure B.14.

B.3.2.2 Medium-sized dividers for samples of cereals in the form of grain.

Minimum of 18 slots; chutes of: 12,7 mm. See Figure B.14.

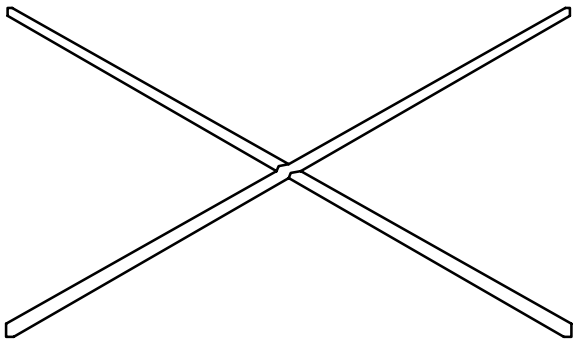


Figure B.13 — Quartering iron

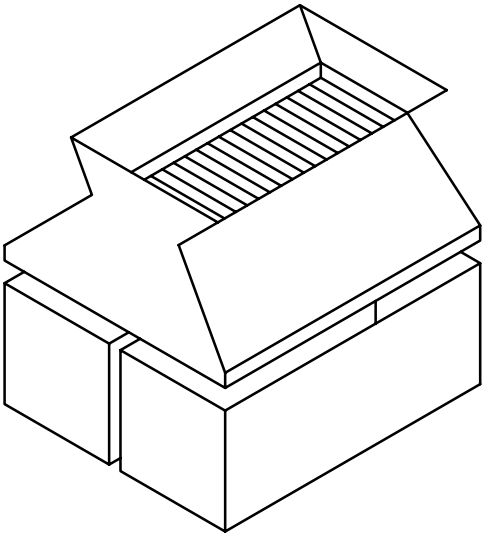


Figure B.14 — Riffle divider: multiple-slot divider (of the type with partitions and plates) with two collection boxes

B.3.3 Cone-shaped dividers (Boerner type)

See Figure B.15.

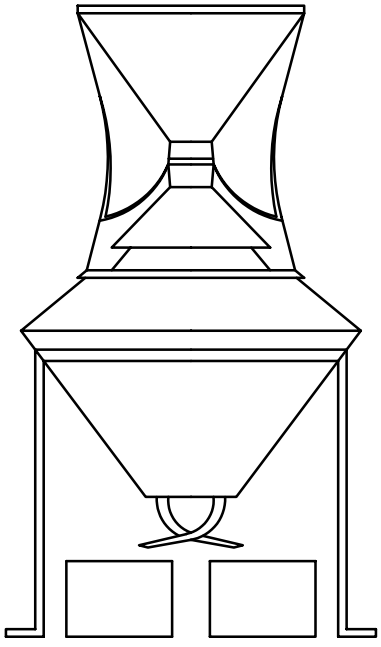
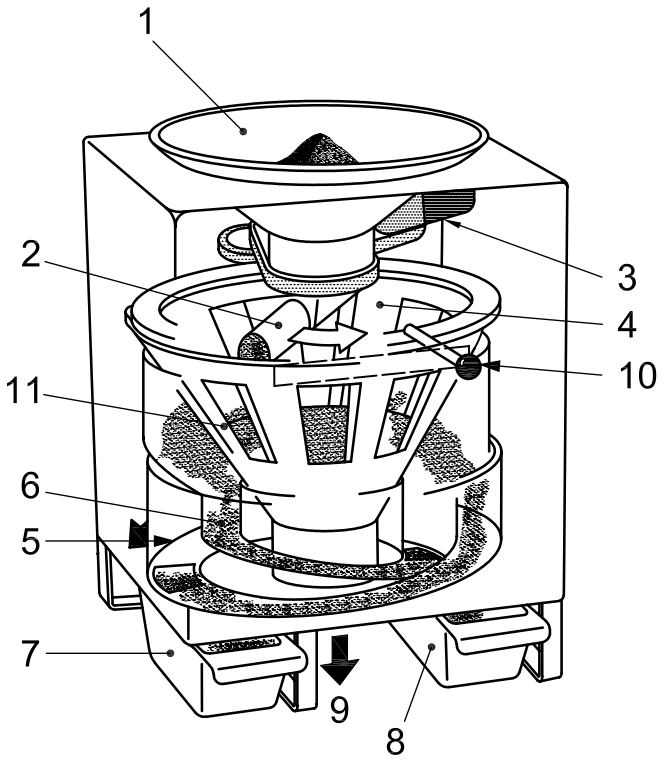


Figure B.15 — Cone-shaped divider (Boerner type)

B.3.4 Rotating mechanical divider

Allows multiple samples to be obtained simultaneously. See Figure B.16.



Key

1 loading hopper
2 rotating chute
3 driving motor
4 cone-shaped hopper with eight apertures
5 sub-sample collection
6 sub-sample collection spout
7, 8 two sub-sample collection boxes
9 excess grain evacuation, grain to put back in the divider
10 adjustment of flaps to modify division factor
11 one of eight adjustable apertures

Figure B.16 — Rotating mechanical divider

B.4 Guide to instruments suitable for sampling cereals and cereal products

Storage condition	Reference to Figures in Annex B	
	Cereals in the form of grain	Milled and other cereal products
Static bulk products in silos, bins and warehouses	B.1, B.2, B.3, B.4, B.5, B.6, B.7	B.12
Wagons, ships and containers for transportation of bulk products	B.1, B.2, B.3, B.4, B.5, B.6, B.7	B.12
Tote bags and rigid containers	B.1, B.2, B.3, B.4, B.5, B.6, B.7	B.12
Sacks and bags (textile fibre, paper and plastic)	B.4, B.5, B.8, B.9, B.10, B.11	B.8, B.9, B.10, B.11, B.12
NOTE The minimum dimensions of the instruments are given for information only.		

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[2] ISO 664, *Oilseeds — Reduction of laboratory sample to test sample*

[3] ISO 3534-2:2006, *Statistics — Vocabulary and symbols — Part 2: Applied statistics*

[4] ISO 6206:1979, *Chemical products for industrial use — Sampling — Vocabulary*

[5] ISO 6644:2002, *Flowing cereals and milled cereal products — Automatic sampling by mechanical means*[1)]

[6] ISO 7002:1986, *Agricultural food products — Layout for a standard method of sampling from a lot*

[7] ISO 13690:1999, *Cereals, pulses and milled products — Sampling of static batches*[2)]

[8] ISO 16002, *Stored cereal grains and pulses — Guidance on the detection of infestation by live invertebrates by trapping*

[9] ISO/TR 29263[3)], *Cereals and cereal products — Sampling studies*

[10] Commission Regulation (EC) 401/2006 of 23 February 2006 laying down the methods of sampling and analysis for the official control of the levels of mycotoxins in foodstuffs

[11] Commission Regulation (EC) 466/2001 of 8 March 2001 setting maximum levels for certain contaminants in foodstuffs

[12] Commission Directive 2002/63/EC of 11 July 2002 establishing Community methods of sampling for the official control of pesticide residues in and on products of plant and animal origin and repealing Directive 79/700/EEC

[13] Commission Directive 2002/70/EC of 26 July 2002 establishing requirements for the determination of levels of dioxins and dioxin-like PCBs in feedingstuffs

[14] Commission Recommendation 2004/787/EC of 4 October 2004 on technical guidance for sampling and detection of genetically modified organisms and material produced from genetically modified organisms as or in products in the context of Regulation 1830/2003

[15] Gafta No. 124, *Sampling rules — Rules for sampling, analysis instructions and analysis certification*. Available (2009-07-15) at: http://www.medimedica.com/Contratti%20tipo/124.pdf

1) Superseded.

2) Superseded.

3) In preparation.

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