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Cereals, pulses and their products — Sampling

Public Review DEAS 900:2024

EAST AFRICAN COMMUNITY

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/ TC 014, *Cereals, pulses and related products*.

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

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.

The lack of consistently applied sampling methods by laboratories within the EAC Partner States has led to discrepancies of test results. The laboratories use either ISO or GAFTA methods for sampling. This prompted the EAC Partner States to develop the East African Standard for Sampling for Cereals and Pulses based on ISO and GAFTA standards. The purpose of this standard is therefore to come up with harmonized sampling procedures to avoid discrepancies and any trade barriers within the EAC region.

Cereals, pulses and their products — Sampling

1 Scope

This draft East African Standard specifies requirements for the dynamic or static sampling, by manual, electronic or mechanical means, for assessment of compliance to East African standards for cereals, pulses and their products.

It is not applicable to seed grain.

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

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

3.1

lot

identified quantity of material (cereal, pulses or their product) from which a sample can be taken and controlled to determine one (or several) characteristic(s)

3.2

sampling

drawing or constituting a sample

3.3

dynamic sampling

drawing or constituting a sample from flowing lot

3.4

static sampling

drawing or constituting a sample from stationary lot

3.5

increment

amount of material taken at one time at each individual sampling point throughout a lot

3.6

aggregate sample

combination of two or more increments (3.5), taken by experimental sampling throughout a lot (3.1), combined and homogenized

3.7

laboratory sample

sample prepared by homogenizing and dividing an aggregate sample (3.6) for sending to the laboratory and intended for inspection or testing

3.8

homogenization

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

3.9

packed unit

quantity of grains or their products contained in a sack, a bag or a retail pack or any other package

Note: Package commodity or unit of product uniformly wrapped and sealed

3.10

sampling error

that part of total estimation of inaccuracy of a characteristic due to the heterogeneity of the characteristics, the nature of sampling and to known and acceptable deficiencies in the sampling plan

3.11

bleeding

opening of grains in sacks and pouring into open spaces/containers so that the grain is in bulk form

4 General requirements

4.1 For the purpose of this standard, sampling includes the following stages:

- a) taking a defined number of increments to constitute an aggregate sample;
- b) homogenization of the aggregate sample; and
- c) reduction of the aggregate sample into the laboratory sample(s).

4.2 Since the composition of the lots of cereals, pulses or their products 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.

4.3 It is essential that cereals, pulses and their products which are damaged on transit (either by water or other contaminants) or out of condition should be kept from the sound grain and sampled separately. Samples of the unsound material damaged in transit shall not be mixed with samples of the sound material.

4.4 Precautions shall be taken to ensure that all equipment used is clean, dry and free from foreign odour. 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.

4.5 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.

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

4.7 Precautions shall be taken to guarantee the integrity of all samples from the moment they are drawn, tested and retained in the laboratory.

5 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.

6 Sampling

6.1 General

Sampling in bulk concerns drawing of samples from both dynamic and static cereals, pulses or their products. In both cases, the sample can be taken using mechanical or manual means.

Sampling from packed units (3.9) only concerns static sampling and only uses manual means.

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

One laboratory sample (3.7) is required by lot or sub-lot of 1 500 tonnes maximum.

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

6.2 Sampling of bulk products

6.2.1 General

Whenever possible, sampling should be carried out when the products are flowing (for example, 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 Table 1 and Table 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.

6.2.2 Sampling of dynamic bulk products

6.2.2.1 General

Since the characteristics and make-up of the lot can vary, the increments shall be taken from the whole lot, that is, as long as the material is dynamic.

6.2.2.2 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.

6.2.2.3 Manual sampling

Take increments at regular intervals.

6.2.3 Sampling of static bulk products

For static sampling, the equipment 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.

Lots of bulk grain which are more than 9 m deep shall be sampled when they are flowing.

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

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

6.2.4 Number and mass of samples of grain

6.2.4.1 Number and mass of increments

The number and the mass of the increments are given in Table 1 and Table 2. All the increments taken together constitute the aggregate sample which shall be homogenized and divided (7.1 and 7.2) to form the laboratory sample.

6.2.4.2 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 Table 1 and Table 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).

6.2.4.3 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 can be obtained. The sampling procedure to obtain the minimum mass of laboratory sample for flowing grain shall be as specified in Table 1.

Table 1 — Sampling of flowing grain by mechanical or manual means

Method	Range of mass of increment g	Minimum number of increment ^a	Minimum mass of laboratory sample for contaminants	Minimum mass of laboratory sample for other analyses
Mechanical sampling	300 - 1 900	<ul style="list-style-type: none"> • 20 per lot or sub-lot of 500 tonnes • 25 per lot or sub-lot of 1 500 tonnes for large batches of size greater than 1 500 tonnes 	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 - 1 900	For contaminants: <ul style="list-style-type: none"> • 20 per lot or sub-lot of 500 tonnes • 25 per lot or sub-lot of 1 500 tonnes for large batches of size greater than 1 500 tonnes For other analyses: <ul style="list-style-type: none"> • 3 per lot or sub-lot of 500 tonnes • 4 per lot or sub-lot of 1 500 tonnes for large batches of size greater than 1 500 tonnes 		
^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.				

6.2.4.4 Sampling of static bulk products

The sampling procedure to obtain the minimum mass of laboratory sample for static grain shall be as given in Table 2.

Table 2 — Sampling of static bulk grain (mechanical sampling systems recommended) in trailers or lorries, wagons, ships or bulk tankers, silos or warehouses

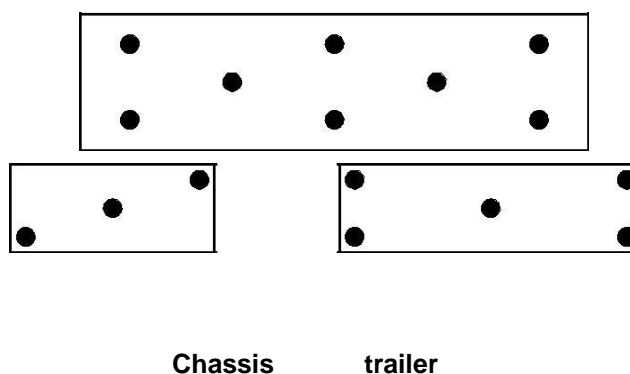
Size of lot or sub-lot <i>m</i>	Range of mass of increment ^a <i>g</i>	Minimum number of increment ^b	Minimum mass of laboratory sample for contaminants	Minimum mass of laboratory sample for other analyses
$m \leq 15$ t	400 - 3 000	3 sampling points	For ochratoxin A and aflatoxins: 10 kg For pesticides, heavy metals, dioxins: 1 kg For other contaminants ^c : 3 kg	1 kg to 3 kg according to the analytical requirements
$15 < m \leq 30$ t		8 sampling points		
$30 < m \leq 45$ t		11 sampling points		
$45 < m \leq 100$ t		15 sampling points		
$100 < m \leq 300$ t		18 sampling points		
$300 < m \leq 500$ t		20 sampling points		
$500 < m \leq 1500$ 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 Frequency according to grain flow ^c Other contaminants like deoxynivalenol (DON), fumonisins, zearalenone; for the determination of DON, the mass of laboratory sample can be 1 kg.				

The number of samples to be taken for laboratory analysis and arbitration shall be subject to an agreement between the parties concerned as per the sampling requirements specified in this standard.

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.

a) For lorries “in one piece” (for example, dumper truck, semi-trailer)



b) For lorries distributed in chassis and trailer

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

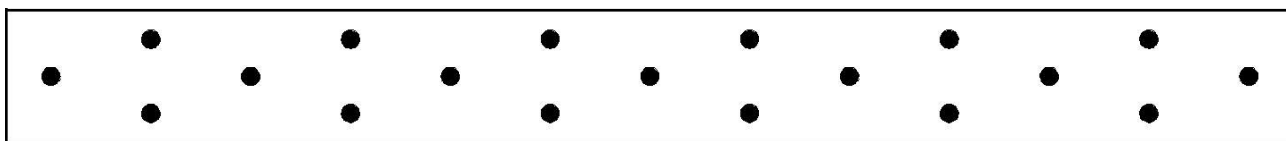


Figure 2 — Examples of the distribution of sampling points for 25 points

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

See Tables 3 and 4.

The sampling procedure to obtain the minimum mass of laboratory sample for flowing milled and other cereal products shall be as given in Table 3.

Table 3 — Sampling of flowing milled and other cereal products by mechanical or manual means

Method	Indicative of mass of increment g	Minimum number of increment	Minimum mass of laboratory sample for contaminants	Minimum mass of laboratory sample for other analyses
Mechanical sampling	300 - 1 900	15 per lot or sub-lot of 100 tonnes (frequency according to flow)	For powdery products: 1 kg For agglomerated products, (for example, pellets): 3 kg	1 kg to 3 kg according to analytical requirements
Manual sampling	300 - 1 900	15 per lot or sub-lot of 100 tonnes, that is, for a flow <ul style="list-style-type: none"> • ≤20 t/h, minimum of 3 per hour • >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.				

The sampling procedure to obtain the minimum mass of laboratory sample for static milled and other cereal products shall be as given in Table 4.

Table 4 — Sampling of static bulk milled and other cereal products (mechanical sampling systems recommended) in trailers or lorries, wagons

Size of lot or sub-lot <i>m</i>	Indicative mass of increment g	Minimum number of increment	Minimum mass of laboratory sample for contaminants	Minimum mass of laboratory sample for other analyses
$m \leq 15$ t	400 - 3 000	3 sampling points	For powdery products: 1 kg For agglomerated products, (for example, pellets): 3 kg	1 kg to 3 kg according to the analytical requirements
$15 < m \leq 30$ t		3 sampling points per compartment		
$30 < m \leq 45$ t		5 sampling points per compartment		
$m > 45$ t		5 sampling points per compartment		
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.				

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

6.3 Sampling from bagged grains

6.3.1 General

Increment samples shall be drawn from original bags selected at random from the consignment which are clearly identifiable with the appropriate markings. The minimum number of bags to be sampled in each consignment shall be in accordance with the scheme in Table 5.

Table 5 — Minimum number of bags to be sampled in each consignment

Number of bags	
In consignment	To be sampled (min)
For up to 20 bags	a sample will be drawn from every bag
For up to 100 bags	Not less than 20 of the bags shall be sampled
101 to 1 000 bags	Not less than 50 of the bags shall be sampled
over 1 000 bags	Not less than 0.5 % (1 in 200 bags) with a minimum of 50 of the bags shall be sampled

Increment samples shall be drawn uniformly, by a piercing spear from the top, middle and bottom of each bag. If it is not possible to draw a sample by spear efficiently, then the original bags may be opened to sample by a hand scoop. So far as is possible samples shall be drawn from the ends and middle of the bags in rotation.

6.3.2 Bags for cutting and starting (bleeding)

When grains are loaded from bags to be cut and bled into the hold(s) of the vessel, increment samples shall be taken at the nearest point to the hold, either in accordance with 6.2.4.3 for goods in bulk, or if not possible, samples shall be drawn from the bags as provided in 6.3 for goods in bags.

6.4 Sampling of milled and other cereal products in packed units

6.4.1 Bales, “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 6.4.3) shall be used to define the appropriate number of crates boxes or pallets that are to be sampled.

6.4.2 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.

6.4.3 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 in Table 5.

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 n th 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 (for example, 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 6 and Figure 3.

Table 6 — 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 contaminant analysis on powdered product or for other analyses on any type of product	Equivalent per pallet
Kg	kg	kg	1 increment every <i>n</i> th packed unit	1 sample shall be all <i>n</i> bags, or 1 sample shall be all <i>x</i> pallets	1 increment every <i>n</i> th packed unit	1 sample shall be all <i>n</i> bags, or 1 sample shall be all <i>x</i> 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	2	0.100				
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	100	1 sample every 100 packed unit, or

				1 sample every 2 pallets		1 sample every 6 pallets
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Table 6 (continued)

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 contaminant analysis on powdered product or for other analyses on any type of product	Equivalent per pallet
kg	kg	kg	1 increment every <i>n</i> th packed unit	1 sample shall be all <i>n</i> bags, or 1 sample shall be all <i>x</i> pallets	1 increment every <i>n</i> th packed unit	1 sample shall be all <i>n</i> bags, or 1 sample shall be all <i>x</i> 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

Note: For unit sizes not specified in the table, a closest unit size shall be referenced for calculation.

2 ←



interval of 16 sacks between two increments

19

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

7 Laboratory sample

7.1 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.

7.2 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 7.2.1, 7.2.2 and 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.

7.2.1 Coning and quartering method

7.2.1.1 Thoroughly mix the aggregate sample by repeating operations 7.2.1.2 and 7.2.1.3 at least twice before dividing as described in operations 7.2.1.3 and 7.2.1.4. Work on a clean, non-absorbent surface and wear personal protective equipment.

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

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

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

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

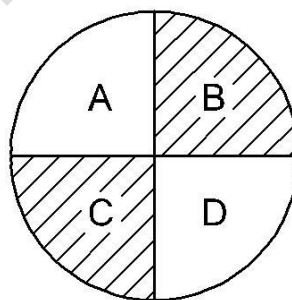


Figure 4 — Coning and quartering method

7.2.2 Sample dividers

Use the divider on a flat surface.

7.2.2.1 Cone-shaped divider

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

7.2.2.1.2 Homogenize the sample by repeating operations 7.2.2.1.3 and 7.2.2.1.4 at least three times and by remixing the subsamples in the hopper.

7.2.2.1.3 Pour the aggregate sample into the closed hopper.

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

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

7.2.2.1.6 Put two empty collection boxes back in position.

7.2.2.1.7 Repeat operations 7.2.2.1.2 to 7.2.2.1.6 as many times as necessary using the sub-sample from 7.2.2.1.5, alternating the collection boxes to be kept until the laboratory sample of the required size is obtained.

7.2.2.2 Rotary mechanical divider

Switch on the centrifugal divider. Pour the aggregate sample into the upper hopper. Proceed as in 7.2.2.1.4 to 7.2.2.1.6. Repeat operations 7.2.2.1.2 to 7.2.2.1.6 as many times as necessary, alternating the collection boxes until the laboratory sample of the required size is obtained.

7.2.2.3 Riffle divider

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

Proceed as in 7.2.2.1.4 to 7.2.2.1.6. Repeat operations 7.2.2.1.2 to 7.2.2.1.6 as many times as necessary, alternating the collection boxes until the laboratory sample of the required size is obtained.

8 Packaging and labelling of samples

8.1 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.

8.2 Labels for samples

The following information shall be legibly and indelibly marked on the labels on the laboratory sample and shall include the instructions required under the terms of the contract, for example:

- a) name of the product
- b) origin of the sample
- c) nature of the product;
- d) mass represented;
- e) lot identifier (number);
- f) contract number (if necessary);
- g) sampling date; and
- h) location and point of sampling.

9 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.

10 Sampling report

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

- a) date of sampling;
- b) name and signature of the persons authorized to carry out sampling;
- c) if necessary:
 - (i) name and signature of the vendor/seller;
 - (ii) name and signature of the purchaser/buyer; and
 - (iii) name and signature of the deliverer;
- d) description of the product, including:
 - (i) name of the sample
 - (ii) lot number
 - (iii) sample reference;
 - (iv) sample mass;
 - (v) lot size; and
 - (vi) sample origin (for example, flat silo, vertical silo, lorry);
- e) the description of the sampling operation, including:
 - (i) location and point of sampling;
 - (ii) number of increments per lot;
 - (iii) number of laboratory samples per lot;
 - (iv) sampling procedure used (equipment, static/flowing, etc.);
 - (v) destination of the sample, e.g. the name and address to which the samples are to be shipped; and
 - (vi) comments if any; and
- f) transportation and storage conditions.

11 Hygiene and safety

The sampling device used shall comply with applicable hygiene and 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.

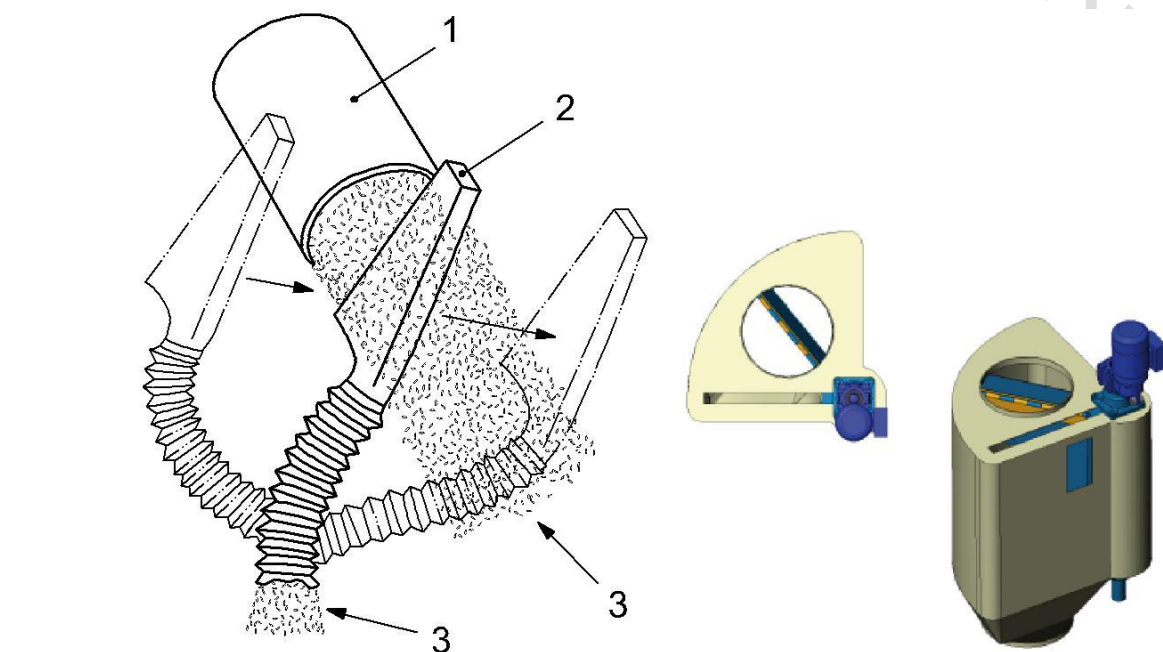
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Annex A (informative)

Examples of mechanical sampling devices used on flowing grain

A.1 Crosscut sampling devices

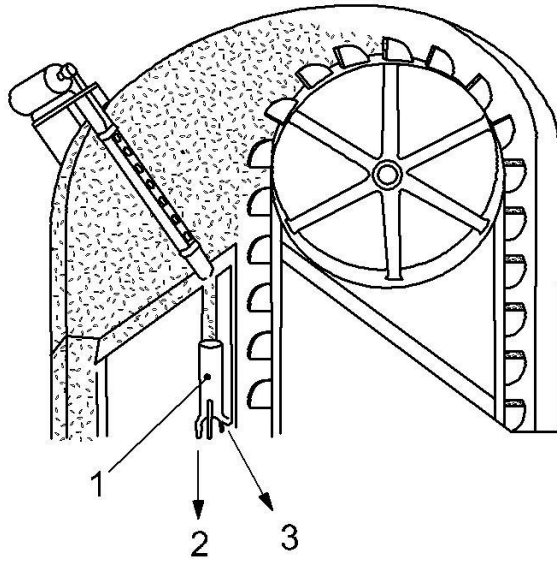
Crosscut sampling devices allow a complete cross-section of a freely falling flow of grains to be taken. They may be open-nozzle sampling devices (see Figure A.1), tubular sampling devices with adjustable apertures (see Figure A.2) or tubular sampling devices with a worm screw (see Figure A.3).



Key

- 1 nozzle
- 2 sampling device
- 3 grain

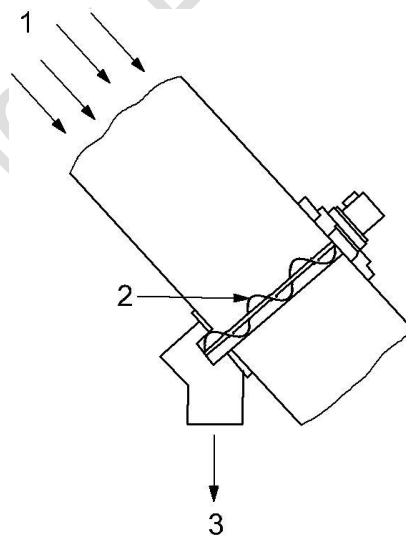
Figure A.1 — Open-nozzle crosscut sampling device, ensuring intermittent, repeated sampling



Key

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

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



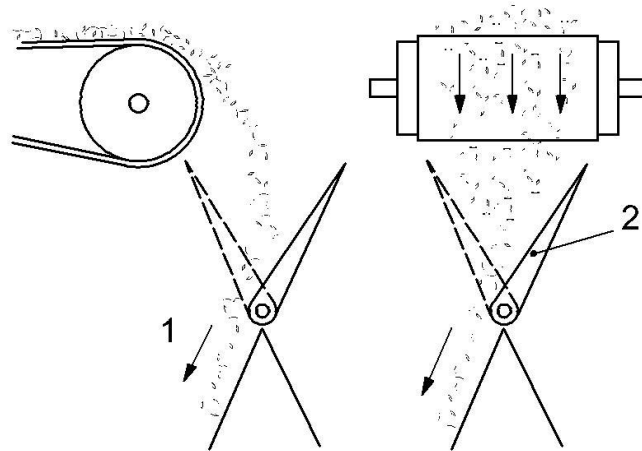
Key

- 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).



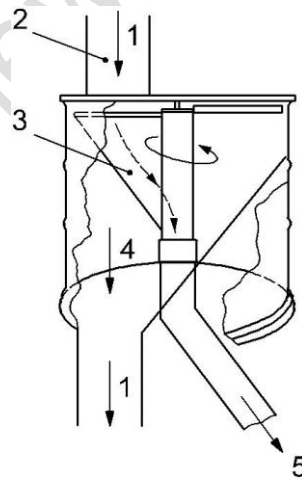
Key

- 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).



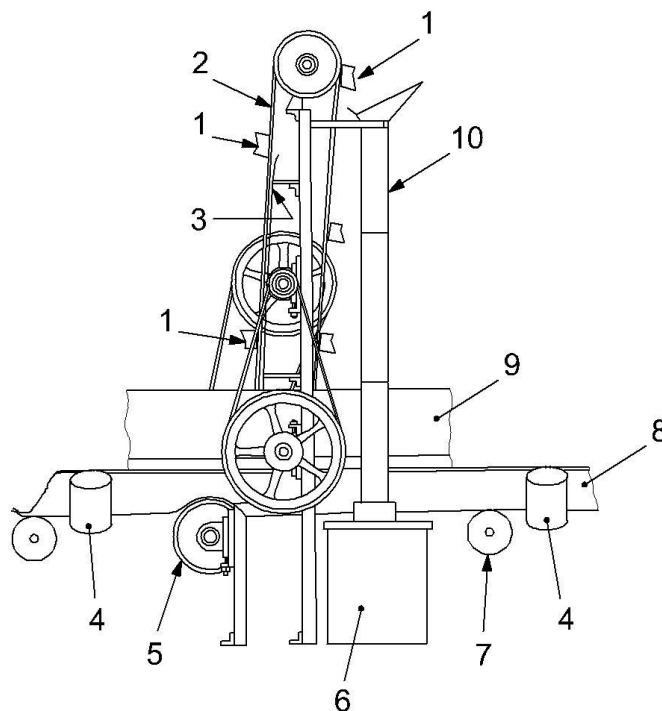
Key

- 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

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.

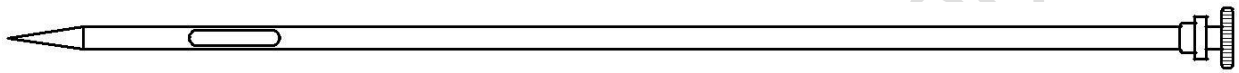


Figure B.1 — Open shaft with single aperture



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.

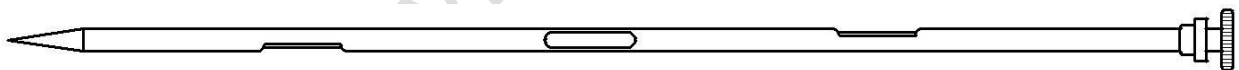


Figure B.3 — Open shaft with several sequentially staggered apertures

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.

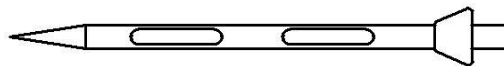


Figure B.4 — Concentric gravity-type tapered probe head

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

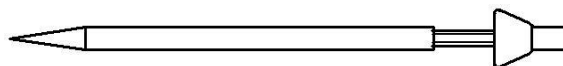


Figure B.5 — Cup-type (head represented in open position)

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.

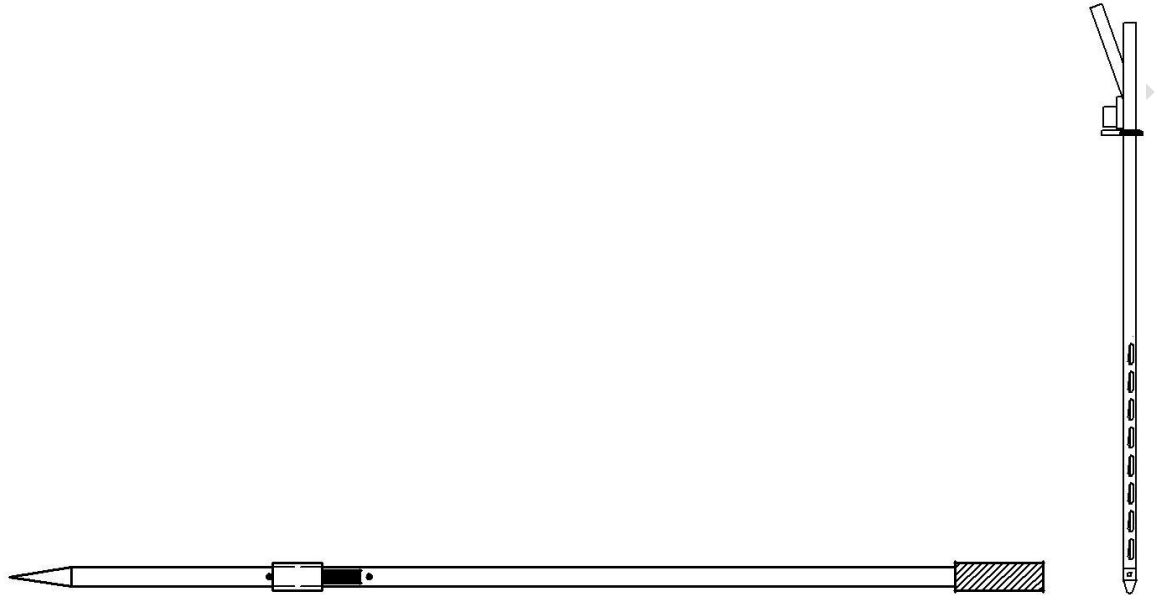
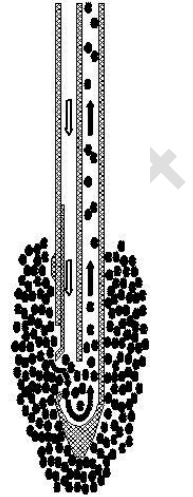
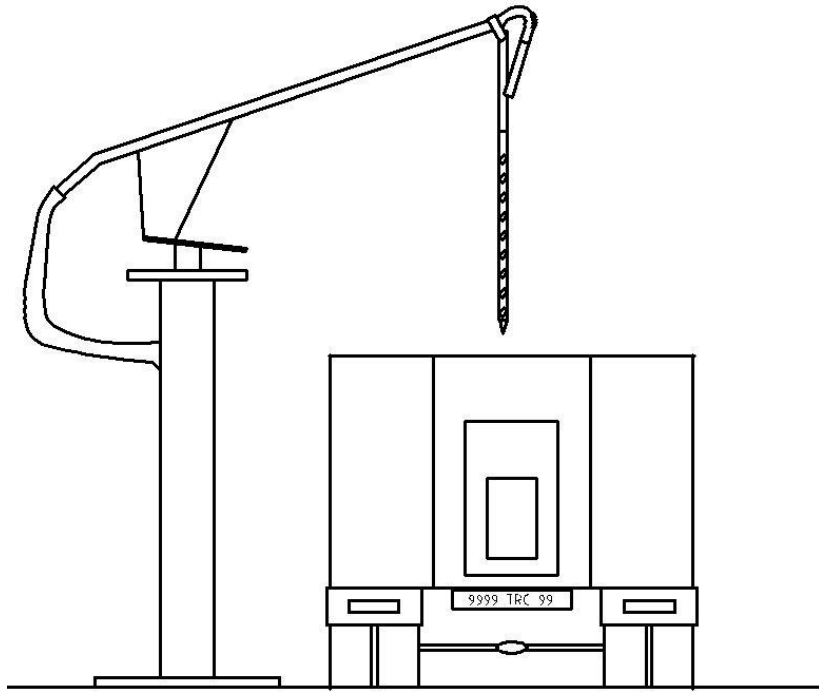
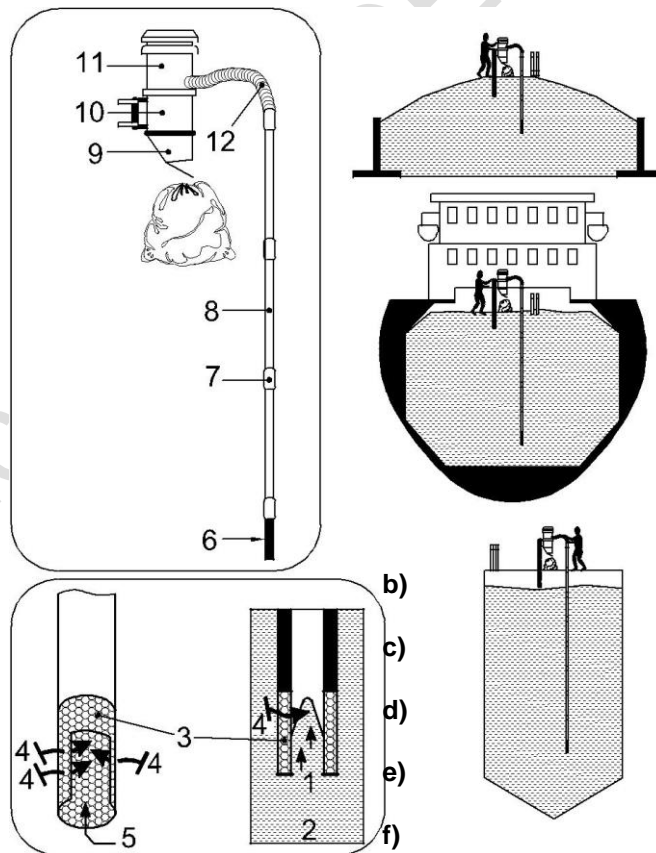


Figure B.6 — Gravity-type sampling device

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



a) Example of sampling from a lorry



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.

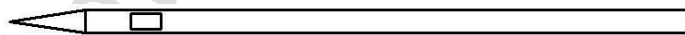


Figure B.8 — Tapered sampling probe for sacks

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).

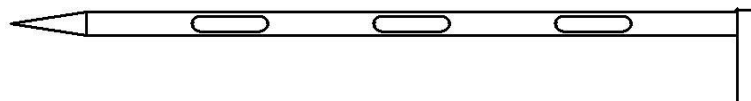


Figure B.9 — “Walking stick”-type, concentric sampling probe for sacks: open shaft with several compartments

B.1.2.3 Cone-shaped sampling device

See Figure B.10.

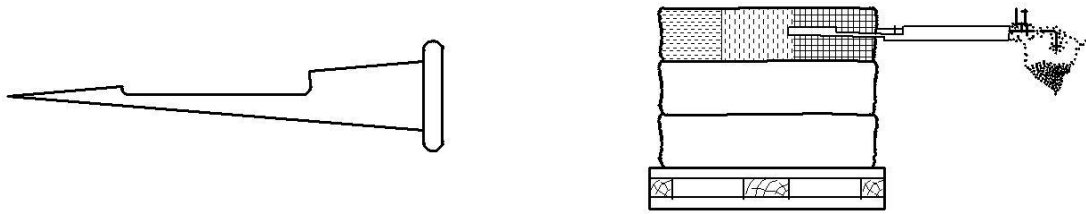


Figure B.10 — Cone-shaped sampling device

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.

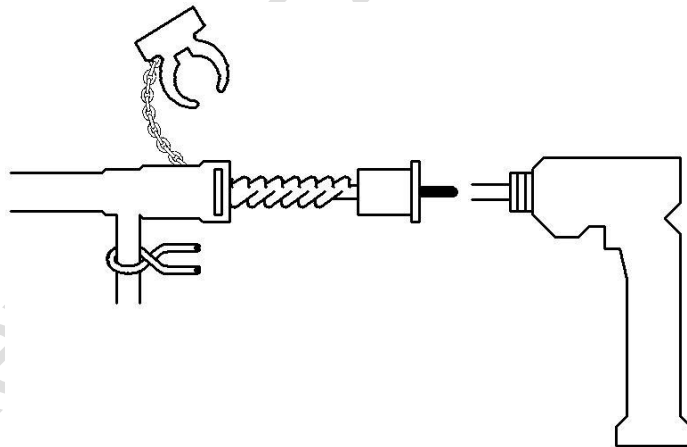


Figure B.11 — Archimedes' screw sampling probe (portable)

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).

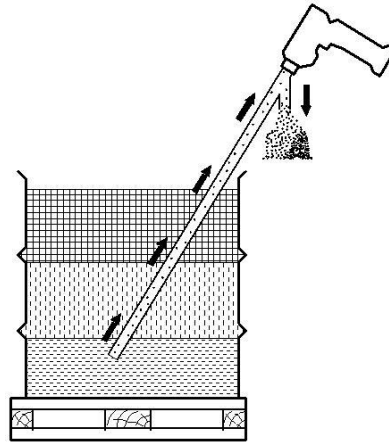


Figure B.12 — Electromechanical Archimedes' screw sampling probe

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.

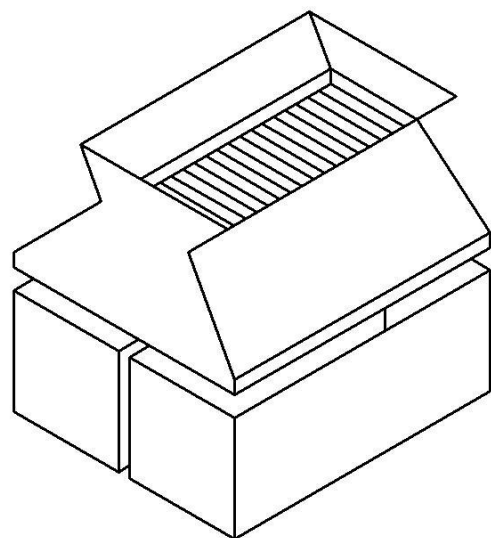
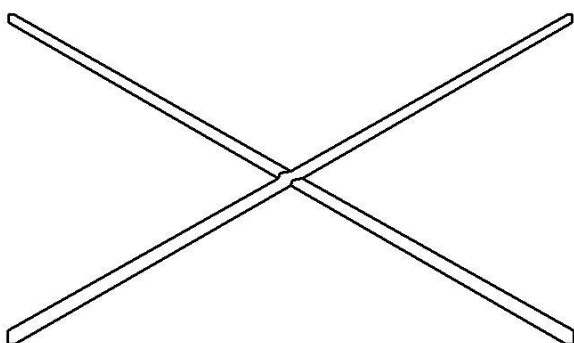


Figure B.13 — Quartering iron

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.

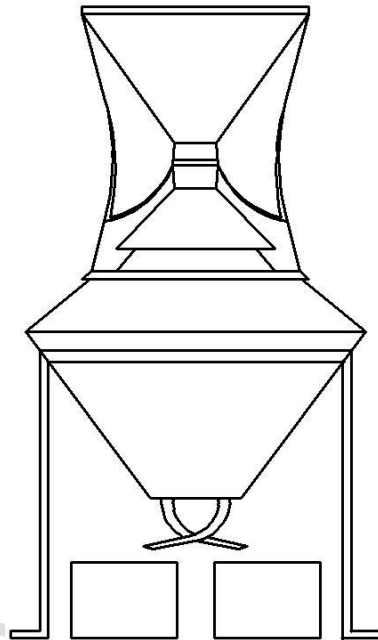
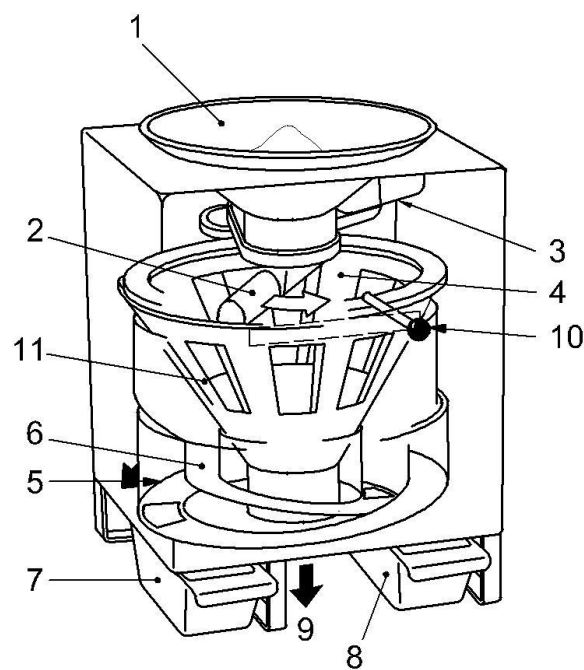


Figure B.15 — Cone-shaped divider (Boerner type)

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. two sub-sample collection boxes
8. excess grain evacuation, grain to put back in the divider
9. adjustment of flaps to modify division factor
10. one of eight adjustable apertures

Figure B.16 — Rotating mechanical divider

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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.		

Bibliography

[1] EAS 900:2017, Cereals and Pulses - Sampling

[2] ISO 24333, *Cereals, pulses and their products — Sampling*

[3] Gafta No. 124, *Sampling rules — Rules for sampling, analysis instructions and analysis certification.*

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