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Cocoa beans — Specification

EAST AFRICAN COMMUNITY

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Foreword

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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. XXXXXX.

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The committee responsible for this document is Technical Committee EASC/TC 002, Coffee, Cocoa, Tea and related products.

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Cocoa beans — Specification

1 Scope

This Draft East African Standard specifies the requirements, sampling and test methods for cocoa beans (*Theobroma cacao* L.) intended for human consumption.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EAS 38, *Labelling of pre-packaged foods — General requirements*

EAS 39, *Hygiene in the food and drink manufacturing industry — Code of practice*

CAC/RCP 72, *Codex of practice for the prevention and reduction of ochratoxin a contamination in cocoa*

ISO 2292, *Cocoa beans — Sampling*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

adulteration

alteration of the composition of a lot of cocoa beans by any means whatsoever

3.2

bean cluster

two or more beans joined together which cannot be easily separated by using the finger and thumb of both hands

3.3

bean count

total number of whole beans per 100 g determined under specific conditions

3.4

broken bean

cocoa bean of which a fragment is missing, the remaining part being more than half of a whole bean

**3.5
cocoa bean**

the whole seed of the cocoa tree (*Theobroma cacao Linnaeus*) which has been fermented and dried

**3.6
cocoa related matter**

bean clusters, broken beans and associated fragments and/or pieces of shell that do not pass through the sieve

**3.7
contamination**

presence of a smoky, hammy or other smell not typical to cocoa, or a substance not natural to cocoa, which is revealed during the cut test or physical inspection of a reference sample

**3.8
cut test**

procedure by which the cotyledons of cocoa beans are exposed for the purpose of determining the incidence of defective and/or slaty beans, and/or the presence of contamination within a test sample

**3.9
defective bean**

internally mouldy bean and/or insect-damaged bean

**3.10
dry cocoa bean**

cocoa beans which have been evenly dried throughout and of which the moisture content meets specific requirements

**3.12
flat bean**

cocoa bean that is too thin to be cut to give a complete surface of the cotyledons

**3.13
foreign matter**

any substance other than cocoa beans, cocoa related matter and sieving husk and placenta are to be considered as foreign matter as well.

**3.14
fragment**

piece of cocoa bean equal to or less than half the original bean

**3.15
germinated bean**

cocoa bean of which the seed germ has pierced the shell as evidenced either by the physical presence of the seed germ or by a hole in the shell following its detachment

**3.16
insect-damaged bean/infested bean**

cocoa bean of which the internal parts are found to contain insects or mites at any stage of development, or show signs of damage caused thereby, which are visible to the naked eye

**3.18
mouldy bean**

cocoa bean on the internal parts of which mould is visible to the naked eye but does not include cocoa beans with white spot, which is a concentration of theobromine or cocoa fat.

3.19

piece of shell

part of the shell without any of the kernel

3.20

reference sample

representative sample prepared by successively quartering the composite sample such that a minimum of 2 kg net remains

3.21

sieve

screen with round holes, the diameter of which are 5 0 mm

3.22

sieving

material that passes through a sieve

3.23

slaty bean

cocoa bean that shows a slaty colour on at least half of the surface of the cotyledons exposed by the cut test irrespective of texture

3.24

smoky bean

cocoa bean with a smoke-off flavour that is reminiscent of wood smoke, acrid smoke, burnt rubber, smoked bacon or soot.

3.25

preliminary test sample

quarter of the reference sample obtained by using a splitter/divider, which can be less than 600 g

3.26

test sample

a sample not less than 600 g of cocoa beans drawn from the reference sample by using a flat-bottomed shovel drawn across the middle of the reference sample

4. Requirements

4.1 General requirements

Cocoa bean shall be:

- a) reasonably free from broken beans, fragments, and pieces of shell;
- b) characteristics of the variety;
- c) clean, free of any visible foreign matter
- d) sound, reasonably free from germinated beans, free of defect and shall not be adulterated;
- e) practically uniform in size and colour;
- f) free from bean clusters and practically free from double bean;
- g) free of any foreign smell and/or off odour; and
- h) free from insect-damaged and/or infested bean

4.2 Specific requirements

4.2.1 Cocoa beans shall comply with those specific requirements stated in Table 1 and Table 2 when tested in accordance with the test methods specified therein

Table 1 — Total defects limits for cocoa beans

S/N	Defects	Grade 1	Grade 2	Grade 3	Test method
I.	Mouldy, %, max	3	4	5	Annex A
II.	Slaty, %, Max	3	8	10	Annex A
III.	Insect damaged/germinated %, max	3	6	10	Annex A

The percentages given in the last column apply to the combined total of all the defects specified in the column header.

4.2.2 When a bean has several defects, it shall be classified in one category only, i.e. the least favourable. The decreasing order of gravity is as follows:

- a) mouldy beans;
- b) slaty beans;
- c) insect-damaged beans; and
- d) germinated beans, flat beans.

Table 2—: Quality requirements for coca beans

S/n	Parameter	Requirement	Test method
i.	Cocoa related matter, m/m, %, max	3.5	Annex B
ii.	Foreign matter m/m, %, max	0.75	Annex B
iii.	Sieving m/m, %, max	1.5	Annex C
iv.	Flat beans, %, max	1.5	Annex B
v.	Moisture content; m/m, %, max	7.5	Annex D

4.3 Bean size

When analysed in accordance with the test method specified therein, cocoa bean shall be classified as per table 3.

Table 3—Bean size classification criteria

S/N	Size	Number of beans per 100g
	Premium size beans	≤ 90
i.	Large beans standard size beans)	>91≤100
ii.	Medium beans	>100≤110
iii.	Small beans	>110 – ≤120
iv.	Very small	>120

5 Hygiene

Cocoa beans shall be produced, prepared and handled in accordance with CAC/RCP 72 and EAS 39.

6 Pesticide residues

Cocoa beans shall comply with those maximum residue limits established by the Codex Alimentarius Commission online database for this commodity.

7 Packaging

Cocoa beans shall be packaged in containers made from food grade packaging material and sealed in a manner that will safeguard the hygienic, nutritional and organoleptic properties of the product throughout the shelf life of the product.

8 Labelling

In addition to the labelling requirements specified in EAS 38, packages of cocoa beans shall be labelled with the following information:

- a) name of the product as “cocoa beans”
- b) grade;
- c) bean size; and
- d) year of harvest

9 Sampling

Sampling shall be done in accordance with ISO 2292.

Annex A (normative) Method for the cut test

A.1 Procedure

The cut test is conducted on the test sample of whole beans from the determination of the bean count in Annex D. Select 300 whole beans irrespective of size, shape and condition, from the test sample.

A.2 Determination

Open or cut these 300 beans lengthwise through the middle, so as to expose the maximum cut surface of cotyledons. Visually examine both halves of each bean in full daylight or equivalent artificial light. Count separately each defective type of bean, i.e. those that are mouldy, slaty, insect-damaged (or germinated, flat).

When a bean is defective in more than one respect, count only the defect that appears first in the list of defects expressed in their decreasing order of gravity, as specified in 4.2.2.

Note: Once the cut test has been effected the cut beans shall not be integrated into the arbitration/reference sample

A.3 Expression of result

Express the result for each kind of defect as a percentage of the 300 beans examined.

Annex B (normative)

Method for determination of cocoa related matter, flat beans and foreign matter

B.1 Procedure

Empty the remainder of the reference sample in Annex C onto a tray of sufficient size to facilitate the measurement of cocoa related matter, flat beans and foreign matter.

Separate, aggregate and weigh each category, i.e. cocoa related matter, flat beans and foreign matter, and express the mass of the quality parameter in relation to the net mass of the reference sample (m_{TOTAL}) in Annex C multiplied by 100.

Once the measurement has been taken, do not re-integrate the matter that has been extracted for testing into the remainder of the reference sample (Derivative 2).

B.2 Expression of result

The quality parameter, PQUALITY (%), is given by formula below:

$$P_{QUALITY} = \frac{m_{QP} \times 100}{m_{TOTAL}}$$

where m_{QP} is the mass of the quality parameter, in g;

m_{TOTAL} is the total net mass of the reference sample, in g.

Annex C
(normative)
Method for determination of the sieving

C.1 Procedure

Weigh the entire reference sample (m_{TOTAL}) and then sieve through a sieve. Collect and weigh the quantity passing through the sieve, which is known as “the sieving”.

Obtain the percentage of the sieving by comparing the mass of the sieving against the total net mass of the reference sample multiplied by 100.

Once the measurement has been taken, do not re-integrate the sieving into the remainder of the reference sample.

C.2 Expression of result

The value of the sieving, S (%), is given by below:

$$S = \frac{m \times 100}{m_{TOTAL}}$$

where m is the mass of the sieving, in g;

m_{TOTAL} is the total net mass of the reference sample, in g.

m_{WHOLE} is the mass of whole beans, in g.

Annex D **(normative)**

Method for determination of moisture content (oven method)

D.1 General

This annex specifies the oven method for the determination of the moisture content of cocoa beans. The moisture content of cocoa beans is, conventionally, the loss in mass determined by the method specified in this annex, and expressed as a percentage by mass.

In addition to the oven method, there are alternative methods of moisture determination using machines or other apparatuses applying technologies such as infrared, capacitance measurement, conductivity, dielectric, nuclear magnetic resonance or neutron probe. Such machines and apparatuses may be used provided that such other technology is correlated to the oven method by a methodology published by the manufacturer together with operational instructions as to frequency and procedure for calibration thereof.

The oven method, however, is the standard reference method and other machines or apparatuses should as far as possible be correlated therewith.

D.2 Principle

After grinding, weighing and drying of cocoa beans for 16 h in a ventilated oven controlled at $103\text{ °C} \pm 2\text{ °C}$, determine the moisture content by calculating the difference in mass.

D.3 Apparatus

Usual laboratory equipment and the following.

D.3.1 Grinder, which allows the beans to be ground without heating.

D.3.2 Ventilated oven, preferably fitted with a fan, capable of being controlled at $103\text{ °C} \pm 2\text{ °C}$.

D.3.3 Dish with lid, of metal, resistant to attack under the conditions of the test, or of glass, with at least 35 cm² of useful surface (for example minimum diameter 70 mm) and 20 mm to 25 mm deep. **D.3.4** Desiccator, containing an efficient desiccant.

D.3.5 Analytical balance, with a readability of 1 mg.

D.4 Procedure

D.4.1 General

Grind a fraction of one quarter of the reference sample with a grinder (D.3.1) to form particles that do not exceed 5 mm, but avoiding the formation of a paste. The beans used shall be representative of the reference sample.

D.4.2 Test portion

Weigh the previously dried empty dish with lid (D.3.3). After grinding the beans in accordance with D.4.1 quickly place in the dish a test portion of 10 g. Weigh the dish with lid, containing the grinded test portion, to the nearest 1 mg.

D.4.3 Determination

Place the dish (D.3.3) containing the test portion on its lid in the ventilated oven (D.3.2) controlled at $103\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$. Leave for $16\text{ h} \pm 1\text{ h}$, taking care not to open the oven. At the end of this period, remove the dish, cover it immediately with its lid and place it in the desiccator (D.3.4). Allow to cool to ambient temperature (approximately 30 min to 40 min after placing in the desiccator) and weigh, still covered, to the nearest 1 mg.

D.4.4 Number of determinations

Carry out two determinations with test portions from the quartered reference sample after grinding, each on a quantity of beans that has been treated individually, i.e. grinding, taking the test portion and drying.

D.5 Note on procedure

The grinding and weighing operations for each determination shall be carried out as rapidly as possible, and in any event within 5 min. When it is not possible to perform the weighing operation within 5 min, the test portion shall be stored in a plastic bag or air-tight container for a maximum period of 2 h. After weighing the test portion, the dish with lid may be left to stand, for example in the case of a series of weighings.

D.6 Expression of result

D.6.1 Method of calculation and formula

The moisture content of the reference sample, expressed as a percentage by mass, is given by Formula (F.1):

$$(m_1 - m_2) \times \frac{100}{m_1 - m_0}$$

where

m_0 is the mass of the empty dish with lid, in g;

m_1 is the mass of the dish with lid and the test portion before drying, in g;

m_2 is the mass of the dish with lid and the test portion after drying, in g.

Take as the result the arithmetic mean of the two determinations (see D.4.4), provided that the requirement for repeatability (see D.6.2) is satisfied. If not, repeat the determinations. Report the result to one decimal place.

D.6.2 Repeatability

The difference between the results of two determinations, carried out simultaneously or in rapid succession by the same analyst, shall not exceed 0,3 g loss in mass per 100 g of the quartered reference sample.

Annex E (normative) Method for determination of the bean count

E.1 Procedure

The bean count determines the average number of whole cocoa beans that weigh 100 g. After sieving in accordance with Annex C and removing cocoa related matter, flat beans and foreign matter in accordance with Annex B, empty the remainder of the reference sample onto a clean, dry, flat surface and thoroughly mix. Take a test sample of not less than 600 g cocoa beans from the reference sample by using a flat-bottomed shovel drawn across the middle of the remainder of the reference sample.

E.2 Determination

Remove any cocoa related matter, flat beans and foreign matter still remaining following the procedure set out in Annex B from the test sample, and then weigh and replace by an equivalent mass of whole beans taken randomly from the remainder of the reference sample. Then count the total number of beans in the test sample. The resulting number is known as the bean count.

E.3 Expression of result

The bean count, n_{BEAN} , shall be expressed as number of beans per 100 g, as given by formula below:

$$n_{\text{BEAN}} = \frac{n_{\text{WHOLE}} \times 100}{m_{\text{WHOLE}}}$$

Where:

n_{WHOLE} is the number of whole beans; and

m_{WHOLE} is the mass of whole beans, in g.

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