ETHIOPIAN STANDARD

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Popcorn - Specification

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Foreword

This Ethiopian Standard has been prepared under the direction of Technical Committee for Starch and Derived Products (TC 24) and published by the Institute of Ethiopian Standards (IES).

The standard has been developed to address observed needs and to support the local industry in order to make progress through uprising competitiveness and maintain comparative market advantage both domestically and internationally.

Information has been gathered from various relevant resources in developing it.

Codex Stan 192, General standard for food additives

Codex Stan 193, General standard for contaminants and toxins in food and feed.

CAC/MRL 2-2015, CAC/MRL 2-2015 Maximum Residue Limits (Mrls) And Risk Management Recommendations (Rmrs) For Residues Of Veterinary Drugs In Foods

Acknowledgement is made for the use of information from the above publication.

Popcorn - Specification

1. Scope

This Ethiopian Standard specifies the requirements, sampling and test methods for popcorn of *Zea mays everta* variety 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.

ES ARS 461, Maize grain (Corn) — Specification

CES 310, Fortified edible oils - with vitamin A and D - Specification

CES 70, Iodized edible salt - Specification

ES 1202, Honey Specification

ES ISO 6540, Maize – Determination of moisture content (on milled grains and on whole grains)

ES ISO 7305, Milled cereal products — Determination of fat acidity

ES ISO 5985, Animal feeding stuffs — Determination of ash insoluble in hydrochloric acid

ES ISO 16050, Foodstuffs – Determination of Aflatoxin B1, and the Total Content of Aflatoxins B1, B2, G1 and G2 in Cereals, Nuts and Derived Products — High- Performance Liquid Chromatographic method

ES 577, General Principles of Food Hygiene – Recommended Code of Practice

ES 929, Code of Practice – Food Hygiene Management

ES ISO 22002-1, Prerequisite programmes on food safety — Part 1: Food manufacturing

ES ISO 4833-1, Microbiology of the food chain – Horizontal method for the enumeration of microorganisms Part 1: Colony count at 30 °C by the pour plate technique

ES ISO 4832, Microbiology of food and animal feeding stuffs - Horizontal method for the enumeration of coliforms - Colony-count technique

ES ISO 21527-1, Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds Part 1: Colony count technique in products with water activity greater than 0,95

ES ISO 21527-2, Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds Part 2: Colony count technique in products with water activity less than or equal to 0,95

ES ISO 7251, Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive Escherichia coli — Most probable number technique

ES ISO 6579-1, Microbiology of the food chain — Horizontal method for the detection, enumeration and serotyping of Salmonella — Part 1: Detection of salmonella

ES ISO 6579-2, Microbiology of food and animal feed — Horizontal method for the detection, enumeration and serotyping of Salmonella Part 2: Enumeration by a miniaturized most probable number technique

ES ISO 6579-3, Microbiology of the food chain — Horizontal method for the detection, enumeration and serotyping of Salmonella — Part 3: Guidelines for serotyping of Salmonella spp.

ES ISO 6888-1, Microbiology of the food chain — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) Part 1: Method using Baird-Parker agar medium

ES ISO 6888-2, Microbiology of the food chain — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) Part 2: Method using rabbit plasma fibrinogen agar medium.

CES 73, General Standard for Prepackaged Foods - Labelling

ES ISO 24333, Cereals and cereal products Sampling

3. Terms and definition

For the purpose of this standard the following terms and definitions shall apply.

3.1.
pop corn
product made from kernels of Zea mays everta variety that have been heated until they forcefully expands and puffs up.

3.2. food grade packaging material
packaging material made of substances which are safe and suitable for their intended use and which will not impart any toxic substance or undesirable odour or flavour to the product.

4. Ingredients

4.1. Essential ingredients

The following essential ingredients shall be used in the preparation of popcorn and shall comply with relevant standards:

a) corn of *Zea mays everta* variety complying with ES ARS 461
b) edible oils complying with CES 310

4.2. Optional ingredients:

The following optional ingredients but not limited to may be used in popcorn and shall comply with relevant standards:

a) salt complying with CES 70
b) sugars complying with their respective Ethiopian standards
c) honey complying with ES 1202
d) vinegar
e) flavouring butter

5. Requirements

5.1. General Requirements

Popcorn shall be:

5.1.1. free from off flavours and odours;
5.1.2. free from insects, larvae, and/or their eggs
5.1.3. free from extraneous matter and other foreign matter such as sand, glass and metal
5.1.4. free from sourness and rancidity
5.1.5. practically free from unpuffed kernels
5.1.6. uniform crispy texture

5.2. Specific Requirements

The product shall comply with the physico-chemical requirements stipulated in Table 1 when tested in accordance with test methods specified therein

Table 1— physico-chemical requirements for popcorn

S/N	Parameter	Requirements	Test method
i.	Moisture content, %, max.	7.0	ES ISO 6540
ii.	Fat acidity, mg KOH per 100 g of product on dry mass basis, max.	80	ES ISO 7305
iii.	Salt content (as sodium chloride), %, m/m, max.	1.2	Annex A
iv.	Acid insoluble ash, %, m/m, max.	0.4	ES ISO 5985

6. Food additives

Only those food additives listed under Codex Stan 192 shall be used and only within the limits specified.

7. Contaminants

7.1. Heavy metals

The products covered by this standard shall comply with the permissible limit of heavy metal contaminants specified in Table 2 below

Table 2 Heavy Metal Contaminants

Characteristics	Maximum Limit	Test Methods
Arsenic (mg/kg) max	0.1	AOAC 942.17
Lead (mg/kg) max	0.1	AOAC 999.10
Cadmium (mg/kg) max	0.1	

7.2. Pesticide residues

The product shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this and related product commodities, CAC/MRL 2-2015.

7.3. Other contaminants

The product shall conform to the maximum levels of the Codex General Standard contaminants and toxins in food and feed (Codex Stan 193).

7.4. Aflatoxins limit

The product shall not exceed above 10 ppb Total Aflatoxin and 5 ppb of Aflatoxin B1 content when tested according to ES ISO 16050.

8. Hygiene

8.1. The product shall be produced, prepared and handled in accordance with ES 577, ES 929 and ES ISO 22002-1

8.2. The product shall be free from pathogenic microorganisms and shall comply with the microbiological limits indicated in Table 3 below.

Table 3 Microbiological limits for the product

Characteristics	Limits	Test Methods
Total plate count, cfu/g, Max.	10^3	ES ISO 4833
Coliform, cfu/g, Max.	10	ES ISO 4832
Yeasts and moulds, cfu/g, Max.	10^2	ES ISO 21527-1 ES ISO 21527-2
Escherichia coli, cfu/ g	Absent	ES ISO 7251
Salmonella spp, cfu/25 g	Absent	ES ISO 6579-1 ES ISO 6579-2 ES ISO 6579-3
Staphylococcus aureus, cfu/ g	Absent	ES ISO 6888-1 ES ISO 6888-2 ES ISO 6888-3

9. Packaging and Labelling

9.1. Packaging

9.1.1. The product shall be packed with clean, sound; free from insect and fungal infestation and the packing material shall be of food grade quality and shall be securely sealed.

9.1.2. The product shall be packed in containers which will safeguard the hygienic, nutritional, and organoleptic qualities of the products.

9.1.3. The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They shall not impart any toxic substance or undesirable odour or flavour to the product.

9.2. Labelling

The labelling shall comply with the requirements of CES 73, and shall be legibly and indelibly marked with thefollowing:

a) name of the product as **"Popcorn"**
b) name and physical address of the manufacturer/packer/ importer/ exporter;
c) list of ingredients in descending order
d) date of manufacture (DD/MM/YYYY);
e) expiry date (DD/MM/YYYY);
f) identification/batch number;
g) allergen declaration;
h) net weight in SI units;
i) country of origin; and
j) instruction for use and storage.

10. Sampling Method

Sampling shall be done in accordance with the method prescribed in ES ISO 24333.

Annex A
(Normative)
Determination of salt content in popcorn

A.1 Reagent

A.1.1 Acetone

A.1.2 calcium acetate solution

A.1.3 HNO3

A.1.4 0.1 N AgNO3

A.1.5 Ferric indicato

A.1.6 0.1 N NH4SCN3

A.2 Procedure

A.2.1 Weigh 2 g of a thoroughly mixed sample into a platinum or silica dish

A.2.2 Disperse the sample with 10 mL of acetone

A.2.3 Remove acetone, at room temperature, with an air current

A.2.4 Add, and thoroughly, mix 10 mL of 10 % calcium acetate solution

A.2.5 Carefully dry on a steam bath

A.2.6 Ash in a muffle furnace at 500 °C (1 022 °F). Complete ashing not necessary

A.2.7 Place the ash in a beaker and dissolve the ash in 25 mL HNO3 (1+3).

A.2.8 Add at least 2 mL - 4 mL of 0.1 N AgNO3 that is just enough to precipitate all chloride present

A.2.9 Add at least 5 mL of 0.1 N AgNO3 in excess, to B.2.8.

A.2.10 Boil, cool, then add 5 mL ferric indicator.

A.2.11 Titrate excess Ag with 0.1 N NH4SCN (which has been standardized to equalize normalities) to a permanent light brown end point.

A.2.12 Subtract the amount of NH4SCN used in B.2.11 from the total AgNO3 used in B.2.8 and B.2.9. The resulting difference is the ml of 0.1 N AgNO3 used in the calculation of salt

A.3 Calculation

The salt content shall be calculated as follows:

$$NaCl = \frac{(mL\ of\ 0.1\ N\ AgNO3)(0.05845)}{gram\ of\ sample}$$

Bibliography

AOAC 942.17 Arsenic in Food: Molybdenum Blue Method

AOAC 999.10, Lead, Cadmium, Zinc, Copper and Iron in Foods: Atomic Absorption Spectrophotometry after Microwave Digestion

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INSTITUTE OF ETHIOPIAN STANDARDS

Organization and Objectives

The Institute of Ethiopian Standards (IES) is the national standards body of Ethiopia. IES is re-named by the proclamation number 1263/2021, from Ethiopian Standards Agency (ESA) to Institute of Ethiopian standards, with the mandate given by the regulation Number, 193/2010 and proclamation number, 1263/2021.

IES's objectives are:

- Develop Ethiopian standards and establish a system that enable to check whether goods and service are in compliance with the required standards,
- Facilitate the country's technology transfer through the use of standards,
- Develop national standards for local products and services so as to make them competitive in the international market.
- Conduct standards related research and provide training and technical support.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational and research institutes, governmental organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/ or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes.

Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices). A catalogue of Ethiopian Standards is also available freely and can be accessed from our website.

 International Involvement IES, representing Ethiopia, is a member of the International Organization for Standardization (ISO), International Electro-technical Commission (IEC) and Codex Alimentarius Commission (CODEX). It also maintains close working relations with the American Society for Testing and Materials (ASTM). It is a founding member of the African Regional Organization for standardization (ARSO).

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