

**ETHIOPIAN
STANDARD**

ES 7265:2025

First edition
xx-xx-2025

Corn Flakes - Specification

ICS: 67.060

Published by Institute of Ethiopian Standards

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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 uprisng 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.

Corn Flakes - Specification

1. Scope

This Ethiopian standard specifies the requirements and methods of sampling and testing for corn flakes/puffed 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.

CES 73, General Standard for Prepackaged Foods - Labelling

ES ARS 461, Maize grains (Corn) — Specification.

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

ES ISO 5223, Test sieves for cereals.

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.

ES ISO 6888-3, Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (*Staphylococcus aureus* and other species)

Part 3: Detection and MPN technique for low numbers

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 ISO 712, Cereals and Derived Products — High- Performance Liquid Chromatographic method

ES ISO 1871, Food and feed products — General guidelines for the determination of nitrogen by the Kjeldahl method

ES ISO 11085, Cereals, cereals-based products and animal feeding stuffs — Determination of crude fat and total fat content by the Randall extraction method

ES ISO 2171, Cereals, pulses and by-products Determination of ash yield by incineration

ES 1066, Durum wheat, durum wheat semolina flour, bread, biscuits and pasta products - Determination of acid insoluble ash

ES ISO 5498, Agricultural Food Products – Determination of Crude Fibre Content – General Method

3. Product description

Corn flakes are prepared from cleaned, sound corn (*Zea mays*). The corn is scoured, degermed, dehulled, and polished, and then:

3.1 cooked after mixing with malt, sugar, and salt, followed by flaking, partial drying, and finally toasting or

3.2 milled and puffed by extrusion after mixing with malt, sugar, and salt, followed by partial drying, and finally toasting

4. Requirements

4.1 General Requirements

Corn flakes shall:

4.1.1 be prepared from cleaned, sound corn complying ES ARS 461.

4.1.2 be tender and crisp,

4.1.3 be reasonably uniform in size, of good flavour, and golden brown in colour.

4.1.4 possess good characteristic taste and odour

4.1.5 be free from rancid, musty, sour, and other undesirable tastes or odours.

4.1.6 be free from living insects and moulds

4.1.7 free from dead insects, insect fragments, and rodent contamination visible to the eye

4.1.8 When immersed in milk or water the product shall readily absorb the liquid and swell substantially presenting a pleasant texture and taste.

4.1.9 not be soggy

4.2 Specific Requirements

4.2.1 Not more than 8 percent by mass of the material shall pass through a 2.00-mm Sieve (ES ISO 5223).

4.2.2 The product shall also conform to the physico-chemical requirements given in Table 1 below.

Table 1 Physico-chemical Requirement for Corn Flakes

Characteristics	Requirements	Test Method
Moisture, percent by mass, Max.	7.5	ES ISO 712
Protein, (on dry basis), % by mass, Min.	5.0	ES ISO 1871
Total fat, % by mass, Max.	8	ES ISO 11085
Total ash, % by mass, Max.	6	ES ISO 2171
Acid insoluble ash, % by mass, Max.	0.2	ES 1066
Crud fiber, % by mass, Max.	3.1	ES ISO 5498

5. Food additives

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

6. Contaminants

6.1. 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	

6.2. 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.

6.3. 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).

6.4. 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.

7. Hygiene

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

7.2. 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.	100	ES ISO 4833
Coliform, cfu/g, Max.	10	ES ISO 4832
Yeasts and moulds, cfu/g, Max.	50	ES ISO 21527-1 ES ISO 21527-2
<i>Escherichia coli</i> , cfu/ g	Absent	ES ISO 7251
<i>Salmonella spp</i> , cfu/25 g	Absent	ES ISO 6579-1 ES ISO 6579-2 ES ISO 6579-3
<i>Staphylococcus aureus</i> , cfu/ g	Absent	ES ISO 6888-1 ES ISO 6888-2 ES ISO 6888-3

8. Packaging and Labelling

8.1. Packaging

8.1.1. 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.

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

8.1.3. 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.

8.2. Labelling

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

- name of the product as “Corn Flakes” or “Puffed Corn”
- name and physical address of the manufacturer/packer/ importer/ exporter;
- list of ingredients
- date of manufacture (DD/MM/YYYY);
- expiry date (DD/MM/YYYY);
- identification/batch number;
- net weight in SI units;
- country of origin; and
- instruction for use and storage.

9. Sampling Method

Sampling shall be done in accordance with the method prescribed in Annex A.

Annex A (Normative) Sampling of Corn Flakes

A-1. General Requirements of Sampling

A-1.0 In drawing, preparing, storing, and handling samples, the following precautions and directions shall be observed.

A-1.1 Samples shall be taken in a protected place not exposed to damp air, dust, or soot.

A-1.2 The sampling instrument shall be clean and dry when used.

A-1.3 Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument, and the containers for samples from adventitious contamination.

A-1.4 The samples shall be placed in clean, odourless, and dry glass containers. The sample containers shall be of such a size that they are almost completely filled by the sample.

A-1.5 Each container shall be sealed air-tight after filling and marked with full details of sampling, batch or code number, name of the manufacturer, and other important particulars of the consignment.

A-1.6 Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the normal temperature.

A-1.7 Sampling shall be done by a person agreed to between the purchaser and the vendor, and in the presence of the purchaser (or his representative) and the vendor (or his representative).

A-2. Scale of Sampling

A-2.1 Lot — All the containers in a consignment belonging to the same batch of manufacture shall constitute a lot.

A-2.1.1 Samples shall be tested from each lot for ascertaining conformity of the material to the requirements of the specification.

A-2.2 The number of containers to be tested from a lot shall depend on the size of the lot and shall be in accordance with Table 4.

Table 4 Number of containers to be selected for sampling

Total Number of Containers in the Lot (N)	Number of Containers to be Selected (n)
1 or 2	All containers
3 to 15	3
16 to 40	5
41 to 110	8
111 to 500	13
501 to 800	22
Above 800	32

A-2.3 The containers to be selected for sampling shall be chosen at random from the lot and, for this purpose, random number tables (see also IS: 4905-1968*) shall be used. In case such tables are not available, the following procedure may be adopted:

Starting from any container, count them as 1, 2, 3, ... up to N, and so on, in a systematic manner. Every r^{th} container thus counted shall be chosen, r being the integral part of N/n (see Table 2).

A-3. Test Samples and Referee Samples

A-3.1 Preparation of Laboratory Samples — Empty out the contents of the container on a sheet of paper and mix thoroughly. Cone and quarter as often as necessary until about 150 g of the material is left. From this, take about 75 g of the material and divide it into three equal parts. Each part so obtained shall constitute an individual sample representing the container and shall be transferred immediately to thoroughly clean and dry containers, sealed air-tight, and labelled with particulars given in A-1.5. The individual samples so obtained shall be divided into three sets in such a way that each set has a sample representing each selected container. One of these sets shall be marked for the purchaser, the other for the vendor, and the third for the referee.

A-3.2 Preparation of a Composite Sample — From the material remaining in each selected container after the individual sample has been taken, equal quantities of the material shall be taken and mixed together so as to form a composite sample weighing not less than 150 g. This composite sample shall be divided into three equal parts and transferred to clean and dry glass containers and labelled with the particulars given in A-1.5. One of these composite samples shall be marked for the purchaser, the other for the vendor, and the third for the referee.

A-3.3 Referee Samples — Referee samples shall consist of a set of individual samples (see A-3.1) and a composite sample (see A-3.2) marked for this purpose and shall bear the seals of the purchaser and the vendor. These shall be kept at a place agreed upon between the two.

A-4. Number of Tests

A-4.1 Tests for requirements given in A-2.2 shall be conducted on each of the samples constituting a set of individual test samples (see A-3.1).

A-4.2 Tests for moisture, total ash, acid insoluble ash, crude fibre, and alcoholic acidity shall be conducted on the composite sample (see A-3.2).

A-5. Criteria for Conformity

A-5.1 The lot shall be considered satisfactory in respect of the requirements of A-4.1 if each individual sample satisfies all the requirements.

A-5.2 The lot shall be considered satisfactory in respect of the requirements of A-4.2 if the test results on the composite sample satisfy the corresponding requirements.

A-5.3 The lot shall be declared to be in conformity with all the requirements of this specification if it has been found satisfactory in accordance with A-5.1 and A-5.2.

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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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.

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