
**Pickled fruits and vegetables –
Specification**

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FOREWORD

This Ethiopian Standard has been prepared under the direction of the Technical committee for fruit and vegetable (TC-13) and published by Ethiopian Standard Agency (ESA).

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

In the preparation of this standard reference has been made to the following:

DKS 2687, *Pickled fruits and vegetables – Specification.*
CAC/RCP 23, *Code of Hygienic Practice for Low and Acidified Low-Acid Canned Foods.*
CAC/GL 51, *Codex Guidelines for Packing Media for Canned Fruits.*
Codex Stan 57, *Codex Standard for Processed Tomato Concentrates.*
Codex Stan 192, *General Standard for Food Additives.*
Codex Stan 193, *General Standard for contaminants and toxins in food and feed.*
Codex Stan 297, *Standard for Certain Canned Vegetables.*

Acknowledgment has been made for the use of information from the above publications.

Pickled fruits and vegetables - Specification

1. Scope

This Ethiopian Standard specifies requirements and methods of test and sampling for pickled fruits and which are offered for direct consumption or further processing, including for catering purposes or for repackaging if required.

Note: The products covered by this Standard include, but are not limited to onions, garlic, mango, radish, ginger, beetroot, royal plum, peppers, hearts of palm, cabbage, lettuce, lemons, baby corn (young corn), and green mustard (*Brassica juncea* ssp). It does not apply to the product when indicated as being intended for further processing. This Standard does not cover pickled cucumbers, kimchi, table olives, sauerkraut, chutneys and relishes.

2. Normative references

The following referenced documents are indispensable for the application 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 –Labeling.

ES 577, Recommended code of practice-General principle of food hygiene.

ES 929, Code of practice-food hygiene management.

ES 1202, Honey-Specification.

ES 1263, Food microbiology- Examination for specific organism - *Clostridium botulinum*.

ES ISO 2447, Fruits, vegetables and derived products - Determination of tin content.

ES 2834, Sampling plans for prepackaged foods (AQL6.5).

ES ISO 6561-2, Fruits, vegetables and derived products - Determination of cadmium content - Part 2: Method using flame atomic absorption spectrometry.

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 6633, Fruits, vegetables and derived products - Determination of lead content - Flameless atomic absorption spectrometric method.

ES ISO 6636-2, Fruits, vegetables and derived products - Determination of zinc content - Atomic absorption spectrometric method.

ES ISO 6637, Fruits, vegetables and derived products - Determination of mercury content - Flameless atomic absorption method.

ES ISO 6888-1, Microbiology of food and animal feeding stuffs -- Horizontal method for the enumeration of coagulase-positive staphylococci (*Staphylococcus aureus* and other species) -- Part 1: Technique using Baird-Parker agar medium.

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

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 7952, Fruits, vegetables and derived products - Determination of copper content - Method using flame atomic absorption spectrometry.

ES ISO 9526, Fruits, vegetables and derived products - Determination of iron content by flame atomic absorption spectrometry.

ES ISO 17239, Fruits, vegetables and derived products - Determination of arsenic content - Method using hydride generation atomic absorption spectrometry.

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 21567, Microbiology of food and animal feeding stuffs — Horizontal method for the detection of *Shigella* spp.

ES ISO 21872-1, Microbiology of the food chain - Horizontal method for the determination of *Vibrio* spp. - Part 1: Detection of potentially enteropathogenic *Vibrio parahaemolyticus*, *Vibrio cholerae* and *Vibrio vulnificus*.

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

3. Description

3.1 Product definition

3.1.1 Pickled fruits and vegetables is the product:

- a) Prepared from sound, clean and edible fruits and/or vegetables, with or without seeds, spices, aromatic herbs and/or condiments;
- b) Processed or treated to produce an acid or acidified product preserved through natural fermentation or acidulants. Depending on the type, appropriate ingredients are added in order to ensure preservation and quality of the product;
- c) processed in an appropriate manner, before or after being hermetically sealed in a container, so as to ensure the quality and safety as well as to prevent spoilage; and/or
- d) Packed with or without a suitable liquid packing medium (e.g., oil, brine or acidic media such as vinegar) as specified in Section 5.1.2, with ingredients appropriate to the type and variety of pickled product, to ensure an equilibrium pH of less than 4.6.

3.1.2 Mixed Vegetables

A product prepared from a mixture of three or more types of fresh or frozen or dry washed clean and sound vegetables

3.2 Styles

- a) Any presentation of the product should be permitted provided that the product meets all requirements of the standard;
- b) Style presentations could include for example, whole, pieces, halves, quarters, cubes, shredded or chopped.

4. Ingredients

4.1 Basic Ingredients

Fruits and vegetables and liquid packing medium when appropriate, as defined in Sections 3.1a), 3.1d) and 5.1.2.1, in combination with one or more of the other permitted ingredients listed in Section 5.2.2.

4.2 Packing Media

- For pickled fruits, in accordance with the *Guidelines on Packing Media for Canned Fruits* (CAC/GL 51-2003).
- For pickled vegetables, in accordance with the following provisions:

4.2.1 Basic Ingredients

Water, and if necessary salt or oil or acidic media such as vinegar

4.2.2 Optional Ingredients

Packing media for pickled vegetables may contain ingredients subject to labelling requirements of section 10.2 and may include, but is not limited to.

- a) Foodstuff with sweetening properties such as sugars (including syrups) as defined in the Ethiopian standard for *sugars*, honey as defined in ES 1202 or juices and/or nectars as defined in the Ethiopian standard;
- b) Aromatics plants, spices or extracts thereof, seasoning (in accordance with the relevant Ethiopian standards for spices or culinary herbs);
- c) Vinegar;
- d) Oil (in accordance with the relevant Ethiopian standards for vegetable oils);
- e) Tomato puree (in accordance with the Standard for Processed Tomato Concentrates (Codex Stan 57-1981));
- f) Malt extract;
- g) Sauce (e.g., fish sauce);
- h) Soy sauce;
- i) Other ingredients as appropriate.

4.3 Other Permitted Ingredients

- i) Cereal grains;
- ii) Dried fruits;
- iii) Malt extract;
- iv) Nuts;
- v) Pulses;
- vi) Sauce (e.g., fish sauce);
- vii) Soy sauce;
- viii) Foodstuff with sweetening properties such as sugars (including syrups) and honey as defined in the Ethiopian standards for *Sugars* and *Honey* in accordance to ES 1202.

- ix) Nutrients For the purpose of product fortification, essential nutrients such as vitamins and minerals may be added to products. Such additions shall comply with national legislation established for this purpose.

NOTE: any optional ingredients added are subject to ingredient labelling requirements (see Clause 10.2).

4.4 Food Additives

Acidity regulators, antifoaming agents, antioxidants, colours, firming agents, flavour enhancers, preservatives, sequestrants, and sweeteners used in accordance with Tables 1 and 2 of the General Standard of Food Additives in the food category in which the individual pickled fruit or vegetable fall into (i.e., one of the following categories: 04.1.2.3, 04.1.2.10, 04.2.2.3, and 04.2.2.7) or listed in Table 3 of the General Standard are acceptable for use in foods conforming to this Standard.

5. Requirements

5.1 General Requirements

The product shall have normal colour, flavour odour and texture characteristics of the product.

5.2 Specific requirements

5.2.1 Pickled fruits and/or vegetables in edible oil

The percentage of oil in the product shall not be less than 10% by weight.

5.2.2 Pickled fruits and/or vegetables in brine or an acidic medium

The percentage of salt in the covering liquid or the acidity of the media shall be sufficient to ensure the keeping quality and proper preservation of the product.

5.2.3 Definition of Defects

- Blemishes - means any characteristic including, but not limited to, bruises, scab, and dark discolouration, which adversely affects the overall appearance of the product.
- Harmless extraneous material - means any vegetable part (such as, but not limited to, a leaf or portion thereof, or a stem) that does not pose any hazard to human health but affects the overall appearance of the final product.

5.2.4 Defects and Allowances

The product should be practically free from defects as defined in Section 5.2.3

5.2.5 Classification of "Defectives"

A container that fails to meet one or more of the applicable quality requirements, as set out in Section 5.2 (except those based on sample averages), should be considered as a "defective".

5.2.6 Lot Acceptance

A lot should be considered as meeting the applicable quality requirements referred to in Section 5.2 when:

- For those requirements which are not based on averages, the number of "defectives", as defined in Section 5.2.3, does not exceed the acceptance number of the appropriate sampling plan in ES 2834; and
- The requirements of Section 5.2, which are based on sample averages, are complied with.

6. Contaminants

The products covered by this Standard shall comply with the maximum levels of the General Standard for Contaminants and Toxins in Food and Feed (Codex Stan 193-1995).

6.1 Pesticide residues

The products covered by this Standard shall comply with the maximum residue limits for pesticides established by the Codex Alimentarius Commission.

6.2 Heavy Metal Contaminants

The products covered by the provisions of this standard shall conform to those maximum limits for Heavy metals contaminants established by the Codex Alimentarius Commission for these products in Table 1 below.

Table 1- Heavy metal contaminants limits for Pickled fruits and vegetables

Contaminants	Limit (mg/kg, Max.)	Test Methods
Arsenic (as As)	0.2	ES ISO 17239
Lead (as Pb)	0.3	ES ISO 6633
Copper (as Cu)	5.0	ES ISO 7952
Zinc (as Zn)	5.0	ES ISO 6636-2
Iron (as Fe)	15	ES ISO 9526
Tin (as Sn)	250	ES ISO 2447
Mercury (as Hg)	0.01	ES ISO 6637
Cadmium (as Cd)	0.05	ES ISO 6561-2

7. Microbiological requirement

Pickled fruits and vegetables shall be free of pathogenic microorganisms and shall conform to the microbiological

requirements in Table 2.

Table 2 - Microbiological limits for pickled fruits and vegetables

Microorganism	Limit	Test Methods
Escherichia coli, cfu/g	Absent	ES ISO 7251
Staphylococcus aureas, cfu/25g	Absent	ES ISO 6888-1, ES ISO 6888-2
Shigella, cfu/25g	Absent	ES ISO 21567
Salmonella, cfu/25g	Absent	ES ISO 6579-3
Colostridium botulinum, cfu/25g	Absent	ES 1263
Vibrio cholera, cfu/25g	Absent	ES ISO 21872-1
Yeast and Moulds, cfu/25g	Absent	ES ISO 21527-1, ES ISO 21527-2

8. Hygiene

Pickled fruits and vegetables shall be manufactured and handled in a hygienic manner in accordance with ES 577, ES 929, ES ISO 22002-1 and CAC/RCP 23-1979.

9. Weights and Measures

9.1 Fill of Container

9.1.1 Minimum Fill

The container should be well filled with the product (including packing medium) which should occupy not less than 90% (minus any necessary headspace according to good manufacturing practices) of the water capacity of the container. The water capacity of the container is the volume of distilled water at 20 °C which the sealed container will hold when completely filled. This provision does not apply to vacuum packaged vegetables. This shall be carried out in accordance to CAC/RM 46-1972.

9.1.2 Classification of "Defectives"

A container that fails to meet the requirement for minimum fill of Section 9.1.1 should be considered as a "defective".

9.1.3 Lot Acceptance

A lot should be considered as meeting the requirement of Section 9.1.1 when the number of "defectives", as defined in Section 9.1.2, does not exceed the acceptance number of the appropriate sampling plan in ES 2834.

9.2 Minimum Net and Drained Weight

The drained weight of the product should be not less than the following percentages, calculated on the basis of the weight of distilled water at 20 °C which the sealed container will hold when completely filled.

- Whole and Halves Style should not be less than 40% of the net weight;
- Pieces Style and Other Styles should not be less than 50% of the net weight (except for pickled red cabbage should not be less than 45% of the net weight).

Table 3 – Drained weight requirements for Pickles

(i) Pickles in Citrus juice or Brine conforming to the following requirements:—

Drained Weight	Not less than 60.0 percent	AOAC 968.30
Sodium Chloride content when packed in Brine	Not less than 12.0 percent	
Acidity as Citric Acid when packed In Citrus Juice	Not less than 1.2 percent	

(ii) Pickles in Oil

Drained Weight	Not less than 60.0 percent	AOAC 968.30
Fruit and Vegetable pieces shall be practically remaining submerged in oil		

(iii) Pickles in Vinegar

Drained Weight	Not less than 60.0 percent	AOAC 968.30
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Acidity of vinegar as acetic acid	Not less than 2.0 percent	
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Note: Pickle without medium means the pickles other than enumerated above. This may contain ingredients given in Para 1 of this specification. Such pickles shall be labelled as "(give name of vegetable or fruits)Pickle".

10. Packaging and Labeling

10.1 Packaging

10.1.1 Pickled fruits and/or vegetables shall be packed which shall be clean, sound, free from insects and fungi infection and the packing material shall be of food grade quality.

10.1.2 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 odor or flavor to the product.

NOTE 1 Packaging materials may be required to meet different regulations in Ethiopia.

10.2 Labelling

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

a) Name of the product

Pickled fruits and/or vegetables shall be labelled according to the type and in combination with the name of major ingredient. Example - a pickle made from ginger shall be labelled "Pickled Ginger in Brine".

The presentation style should be declared on the label of the food.

The name of the product shall include the indication of the packing medium as set out in Section 3.1(d).

In the case of mixed vegetables; List of the names of the various vegetables species used in the mix shall be listed in descending order of the proportions

b) Additional Requirements

Drain weight declaration content; pickled fruits and vegetables must be labelled with a declaration of "Drained weight content %".

c) Pickled fruits and vegetables containing spices and/or aromatic herbs

Where tomato juice contains spices and/or aromatic herbs in accordance with Section 3.1.2(f), the term "spiced" and/or the common name of the aromatic herb shall appear on the label near the name of the juice.

11. Methods of sampling

Sampling of Canned asparagus shall be done in accordance with ES 2834.

DETERMINATION OF WATER CAPACITY OF CONTAINERS (CAC/RM 46-1972)

1. SCOPE

This method applies to glass containers.

2. DEFINITION

The water capacity of a container is the volume of distilled water at 20 °C which the sealed container will hold when completely filled.

3. PROCEDURE

Select a container which is undamaged in all respects.

Wash, dry and weigh the empty container.

Fill the container with distilled water at 20 °C to the level of the top thereof, and weigh the container thus filled.

4. CALCULATION AND EXPRESSION OF RESULTS

Subtract the weight found in 3.2 from the weight found in 3.3. The difference shall be considered to be the weight of water required to fill the container. Results are expressed as ml of water.

Organization and Objectives

The Ethiopian Standards Agency (ESA) is the national standards body of Ethiopia established in 2010 based on regulation No. 193/2010. ESA is established due to the restructuring of Quality and Standards Authority of Ethiopia (QSAE) which was established in 1998.

ESA's objectives are:-

- ❖ Develop Ethiopian standards and establish a system that enable to check whether goods and services 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.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational institutions, research institutes, government 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 in from our website.

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International Involvement

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

More Information?

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