ETHIOPIAN STANDARD

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Canned mushrooms – 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 343: 2016, *Canned mushrooms- Specification.*

CAC/RM 46-1972, Codex General Method for processed fruits and vegetables.

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.

CAC/RCP 1, General Principles of Food Hygiene.

CAC/RCP 23, Code of Hygienic Practice for Low and Acidified Low-Acid Canned Foods.

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

Canned mushrooms - Specification

1. Scope

This Ethiopian Standard specifies requirements and methods of test for canned mushrooms, the product prepared from fresh mushrooms of the cultivated varieties (cultivars) of the genus *Agricus* (*Psalliota*), including *A. bisporus*, packed in juice exuding from the mushrooms or other suitable media and processed by heat in an appropriate manner, so as to prevent spoilage.

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 58, Drinking water (other than any packaged water) – Specification.
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 4833-1, Microbiology of the food chain - Horizontal method for the enumeration of microorganisms - Part 1: Colony count at 30 0C by the pour plate technique.
ES ISO 6561-2, Fruits, vegetables and derived products - Determination of cadmium content - Part 2: Method using flame atomic absorption spectrometry.
ES ISO 6 579-3, 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 6 888-1, Microbiology of food and animal feeding stuffs - Horizontal method for the enumeration of coagulase-p-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 hydridegeneration atomic absorption spectrometry.
ES ISO 21527-1, 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

The fresh mushrooms shall be in good condition and after cleaning and trimming shall be sound.
Heat treatment is strongly recommended after the material has been sealed in the container.

3.1 Product definition

Canned mushrooms is product prepared from the sound, succulent, fresh mushroom (*Agaricus spp*) by proper trimming, washing, and sorting conforming with the characteristics of any suitable cultivated varieties (cultivars) of the genus *Agaricus* (Psalliota), and is packed with the addition of water in hermetically sealed containers and sufficiently processed by heat to assure preservation of the product.

3.2 Colour Type

3.2.1 White or cream.

3.2.2 Brown.

3.3 Styles and Sizing

3.3.1 Buttons - Whole mushrooms, with attached stems not exceeding 5 mm in length, measured from the bottom of the veil.

3.3.2 Sliced Buttons - Buttons cut into slices 2 mm or 6 mm thick, of which not less than 50% are cut parallel to the axis of the mushroom.

3.3.3 Whole - Whole mushrooms, with attached stems cut to a length not exceeding the diameter of the cap, measured from the bottom of the veil.

3.3.4 Sliced or Sliced Whole - Mushrooms cut into slices 2 mm or greater mm thick, of which not less than 50% are cut with regular thickness, parallel to the axis of the mushroom.

3.3.5 Random Sliced - Mushrooms cut into slices of varying thickness and in which the slices may deviate materially from cuts approximately parallel to the axis of the mushroom.

3.3.6 Quarters - Mushrooms cut into four approximately even parts.

3.3.7 Stems and Pieces (Cut) - Pieces of caps and stems of irregular sizes and shapes.

3.3.8 Grilling - Selected open-veiled mushrooms not exceeding 40 mm in diameter, with attached stems not exceeding the diameter of the cap, measured from the bottom of the veil scar.

3.3.9 Other Optional Styles - Other forms not specifically described in 1.4.1 through 1.4.8 above such as diced or chopped which are appropriately described on the label.

3.3.10 Other Styles - Any other presentation of the product shall be permitted provided that the product:

a) is sufficiently distinctive from other forms of presentation laid down in this standard;

b) meets all relevant requirements of this standard, including requirements relating to limitations on defects, drained weight, and any other requirements in this standard which are applicable to that style in the standard which most closely resembles the style or styles intended to be provided for under this provision;

c) is adequately described on the label to avoid confusing or misleading the consumer.

3.3.11 Tolerance for the Styles "Buttons" and "Whole"- 10%, by count, of the units for the respective style may exceed the specified stem length.

4. Composition

4.1 Basic Ingredients

Water, and if necessary salt, and/or juice exuding from the mushrooms

The potable water used shall comply with the requirements of CES 58.

4.2 Other permitted Ingredients

Packing media may contain ingredients subject to labeling requirements of Section 9 and may include, but is not limited to:

- Juice exuding from the mushrooms;
- Water, salt, spices, seasonings, soya bean sauce, vinegar, wine;
- Sucrose, invert sugar syrup, dextrose, glucose syrup, dried glucose syrup;
- Butter or other edible animal or vegetable fats or oils, including olive oil; milk, milk powder, or Cream (complying to Ethiopian Standards). If butter is added, it must amount to not less than 3% m/m of the final Product;
- Starches - natural (native), physically or enzymatically modified - only when butter or other edible animal or vegetable fats or oils are ingredients;
- Wheat or corn flour;
- Sugars and Sweetening Agents - Sucrose, glucose (dextrose anhydrous) or fructose with less than 2 % moisture may be added only to products intended for sale to the consumer or for catering purposes;
- Honey - The quality of honey used shall comply with ES 1202;
- Tomato puree;

- Regular or concentrated fruit juice;
- Vinegar;
- Spices and aromatic herbs/plants or extracts thereof, seasoning salt and spices and aromatic herbs (and their natural extracts) may be added to Juice exuding from the mushrooms;
- Wine; and
- Vinegar.

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).

5. Requirements

5.1 General Requirements

5.1.1 The mushroom portion of the product shall have normal colour characteristics of the variety of the canned mushrooms. Canned mushrooms of special types and containing special permitted ingredients shall be considered of characteristic colour when there is no abnormal discolouration for the respective ingredients used.

5.1.2 The liquid medium in water, brine and/or juice exuding from the mushrooms shall be either clear or slightly turbid and yellow to light brown in colour.

5.1.3 The mushrooms in water, brine, and/or juice exuding from the mushrooms shall be firm and substantially intact.

5.2 Specific Requirements

5.2.1 Uniformity

For styles in general, 10%, by count, of the units for the respective style may exceed the specified stem length or size.

5.2.2 Defects and Allowances

Canned mushrooms should be substantially free from defects. Certain common defects should not be present in amounts greater than the limitations fixed in the Table 1 below.

Defects	Definition	Tolerances
(a) Spotted mushrooms	a mushroom is spotted when it presents a dark brown to brown spot diameter upper to 3 mm or when it is very speckled (more than 10 spots).	5% by weight
(b) Traces of casing material	mushroom or piece of mushroom on which remains a part of root and\or soil and\or grit, or any other extraneous matter, whether of mineral or organic origin, of more than 2 mm in diameter attached or not to the mushroom.	5% by weight of affected product
(c) Open mushroom for “buttons” and “whole mushrooms”:	a mushroom is opened if small strips are visible on at least half of the circumference and if the distance between the cap and the stem is up to 4 mm.	10% by count
(d) Broken mushroom or pieces of mushroom or mushrooms with detached caps or stems for “buttons”, “whole mushrooms” and “grilling mushrooms”	mushroom which is missing at least the quarter of the cap, caps and only stems.	10% by weight

5.2.3.1 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”.

5.2.3.2 Lot Acceptance

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

a) for those requirements which are not based on averages, the number of “defectives”, as defined in Section 5.2.3.1, does not exceed the acceptance number of the appropriate sampling plan in ES 2834; and

b) the requirements of Section 5.2, which are based on sample averages, are complied with.

6. Food Additives

Thickeners, emulsifiers and stabilizers used in accordance with Table 3 of the *General Standard for Food Additives* (CODEX STAN 192-1995) for Food Category 04.2.2.4 are acceptable for use in canned mushrooms in sauce only.
Only the colour listed in Table 2 below is permitted for use in canned mushroom in sauce.

Table 2 - Food Additive

INS No.	Name of the Food Additive	Maximum Level
150a	Caramel I – plain caramel	GMP
150c	Caramel III – ammonia caramel	50,000 mg/kg
150d	Caramel IV - sulfite ammonia caramel	50,000 mg/kg

Flavour enhancers used in accordance with Table 3 of the General *Standard for Food Additives* (CODEX STAN 192-1995) for Food Category 04.2.2.4 are acceptable for use in canned mushrooms.

7. 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).

7.1 Pesticide residues

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

7.2 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 3 below.

Table 3 – Heavy metal contaminants limits for canned mushrooms

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

8. Hygiene

8.1 Canned Mushrooms shall be manufactured and handled in a hygienic manner in accordance with ES 577, ES 929 ES ISO 22002-1, CAC/RCP 1-1969 and CAC/RCP 23-1979.

8.2 Dehydrated vegetables shall be free of pathogenic microorganisms and shall conform to the microbiological requirements in Table 4.

Table 4 - Microbiological limits for canned Mushrooms

Microorganism	Limit	Test Methods
Total plate count, cfu/g, Max.	50	ES ISO 4833-1
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

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 head space 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 ^{0}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.

9.1.4 Minimum Drained Weight

9.1.4.1 The drained weight of the product should be not less than the percentages indicated in the corresponding Annexes, calculated on the basis of the weight of distilled water at 20 ^{0}C which the sealed container will hold when completely filled.

9.1.4.2 Canned mushrooms in water; brine, and/or exuded juices; vinegar; wine and oil packs.

The drained weight of the product shall be not less than 53% of the weight of distilled water at 20 ^{0}C which the sealed container will hold when completely filled.

9.1.4.3 Canned mushrooms in sauce packs

The drained mushroom portion, after washing off the sauce or liquid, shall be not less than 27.5% of the total product weight.

10. Packaging and Labelling

10.1 Packaging

10.1.1 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 suitable flavor to the product.

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

10.2 Labeling

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

a) Name of the product

The following styles shall be included as part of the name or in close proximity to the name: "Buttons", "Sliced Buttons", "Whole", " Sliced" or " Sliced W hole", " Random Sliced", "Q uarters", "Stems an d P ieces (Cut)", "Grilling", as appropriate

A declaration of any special sauce which characterizes the product, e.g. "With X" or "In X" when appropriate. If the declaration is "With (or "In") Butter Sauce", the fat used shall only be butter fat.

When the vegetables are sized, the size (or sizes when sizes are mixed), as defined in the corresponding Annexes, may be declared as part of the name or in close proximity to the name of the product.

The name of the product shall include the indication of the packing medium as set out in Section 5.2.4. For canned vegetables packaged in accordance with Section 3.1.2 (b) the words "vacuum packaged" shall be affixed to the commercial designation of the product or in close proximity.

Other styles - If the product is produced in accordance with the other styles provision (Section 3.2.1), the label should contain in close proximity to the name of the product such additional words or phrases that will avoid misleading or confusing the consumer.

If an added ingredient, as defined in Sections 3.1.2 and 3.1.3, alters the flavour characteristic of the product, the name of the food shall be accompanied by the term "flavoured with X" or "X flavoured" as appropriate.

b) Additional Requirements

Drain weight declaration content- Canned vegetables must be labelled with a declaration of "Drained weightr content %.10.1.2.6 Ingredient declaration

c) Mushrooms 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 ^{0}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 ^{0}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.

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Ethiopian Standards Agency

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 or ganizations, 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.

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).

<u>More Information</u>?
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